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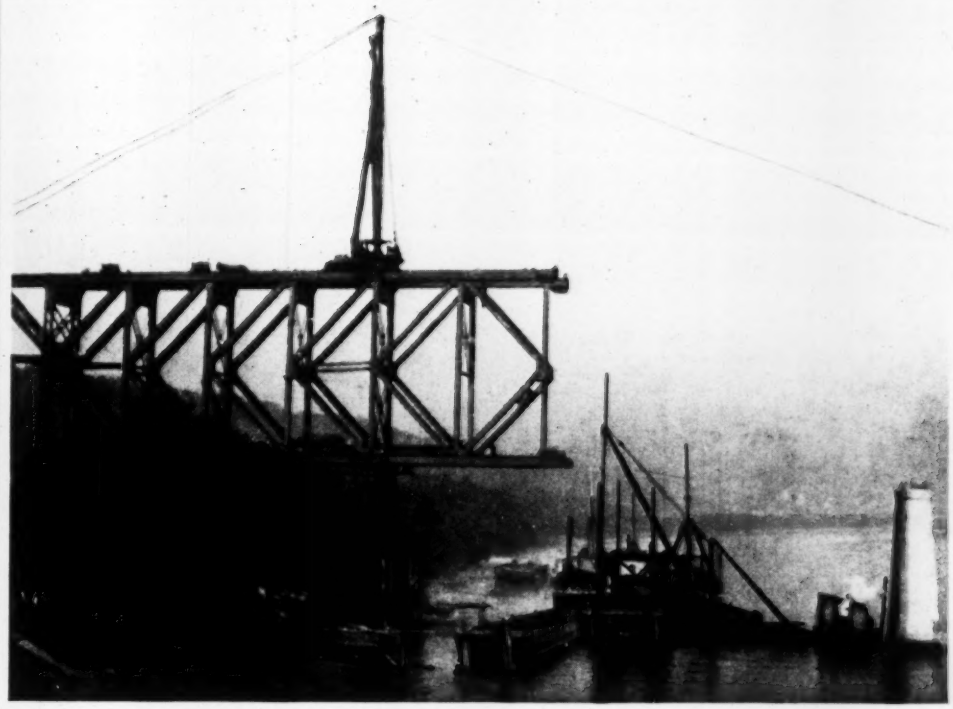

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Milwaukee's New Rapid Transit Line

K-Type Bracing Used in Long-Span Bridge Truss

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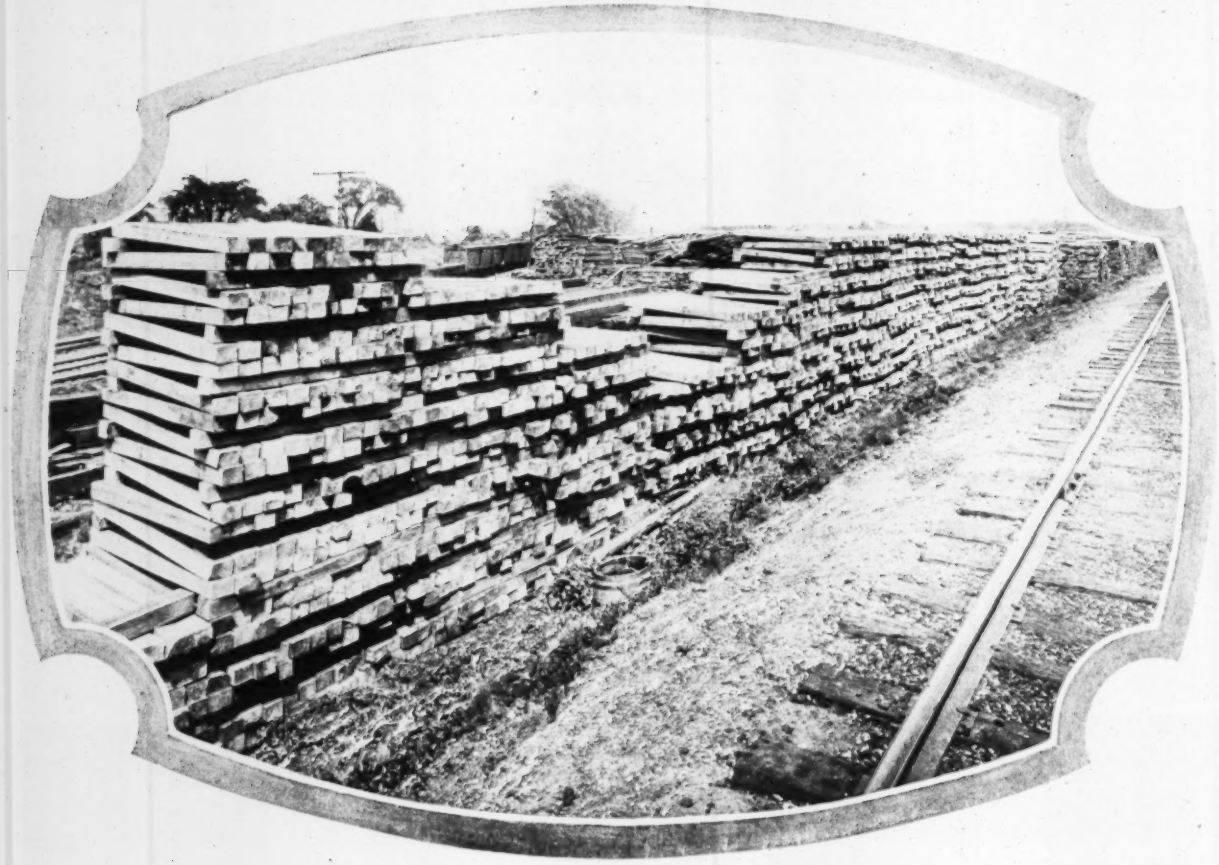

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Contents for April 2, 1931

VOLUME 106, NUMBER 14

Copyright, 1931, by McGraw-Hill Publishing Company, Inc.

Milwaukee's Rapid-Transit Railroad..... 550

K-Type Bracing for Long-Span Bridge Trusses..... 553

Overcoming Taxpayer Resistance to Public Improvements.... 554

Steep Incline Railway Down Side of Royal Gorge..... 555

Calculating Flood Discharge Over an Embankment..... 557
BY ALBERT S. FRY AND G. H. HICKOX

Akron Sewage-Treatment Plant Costs Distributed by Units.... 559
BY A. B. BACKHERMS

Concrete Mill Design Governed by Machinery Layout..... 561
BY EDMUND WILKES, JR.

Water-Supply Conditions in the Drought Regions..... 565

Premixed Tar Macadam..... 568
BY GEORGE E. MARTIN

Penetration Tests Give Bearing Power of Deep Subsurface Soils 570
BY GEORGE PAASWELL

Editorial 547
Letters 572
News 573
Equipment News... 579
Unit Prices 580
Business News.... 583
Materials Prices... 586

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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 106 NEW YORK, APRIL 2, 1931 Number 14

Not a Gold Mine

FIGURES on the earnings of the Bear Mountain bridge came to public knowledge recently for the first time, through a state report on the prospective purchase of the bridge. It appears that in the six years since its opening this pioneer of modern toll bridges has covered its operation and almost wholly covered its interest costs, without surplus. These were its years of development, of course, and with the inevitable growth of traffic a better showing should result for the next few years. On the whole, therefore, the project has proved itself to be not a gold mine but a fair business investment. In this respect it is far ahead of many other toll bridge undertakings, which have not been able to pay their bond interest charges. Few or none of the toll bridges of the recent era of promotion have justified the extravagant expectations of their promoters or the rapacious financing systems often applied. But the best of them are excellent business ventures for all that—when based on true instead of inflated costs. The Bear Mountain bridge, as the trailbreaker of the series of modern highway bridges over major water barriers, deserves a special place in the records of the art and has a quite particular claim to adequate return on its cost. It brought into being many of the important traffic facilities that we now enjoy. The men who conceived it opened an important field of useful construction.

Politics Again

ARIZONA has again assumed prominence in highway administration idiocy by compelling the resignation of an efficient chief engineer and disrupting the morale of the entire staff of its highway department by a general cut in salaries. The facts of the situation are made sufficiently plain in the news account published on another page. The politics and personalities behind the bare facts are about as sordid and as contemptuous of sound highway policies as a long history of political interference in public works in America has exhibited. For Arizona the results cannot help being entirely harmful. The disorganization that must result throughout the highway department at a time when the public interest demands the highest efficiency in administration can have only a serious effect on Arizona's highway program and the general condition of the state. In a broader way the reduction in engineering salaries to a point well below the standard set by other states, particularly at a time when these officials are being called upon to exert extraordinary efforts, reflects a most surprising lack of administrative acumen. The disheartening effect on the organization will be paid for many times in the shape of losses to the public. Incidentally, the entire engineering profession will resent this affront to the proper recognition of its value in such a technical field as highway work. Thus, a doubly serious charge can be laid to present political interference with the Arizona highway organization.

Cutting Mill Construction Costs

INTERESTING problems in mill construction were involved in building the feed mill described in this issue. Ordinarily the design and construction of a mill building is looked upon as a routine operation requiring no special study. But in the feed mill built for the Ralston-Purina Co. at Denver the requirement that deep grain storage bins be supported in definitely established positions above the milling machinery necessitated the introduction of unusual details such as suspended floors and self-supporting bin walls. As the mill was to be built of reinforced concrete and would have many solid walls, the desirability of sliding forms for part of the work at least was obvious; employment of such forms for other parts of the building was made possible by deepening the webs of beams which came in the vertical plane of the walls and by giving them the same thickness as the walls. Placing the concrete in winter added one more item of interest. In the sliding form work the methods of protecting the fresh concrete by housing suspended below the moving forms, heretofore found satisfactory for such work, was adopted. The whole operation is a good example of the way in which close cooperation between the design and construction forces can cut construction costs.

Subsurface Load Tests

BEARING power tests of deep subsoils by resistance measurements of various kinds in cased drill holes have been extensively studied by German and Austrian engineers. Some of their experience has been brought to America in the series of penetration-resistance tests devised by Dr. Charles Terzaghi for a section of the New York City subway work and described briefly in this issue. The tests as carried out, with calibration by means of direct loading in occasional deep test pits, proved to give a reliable index of soil behavior under load and were an aid to the contractor in planning his construction methods. In interpreting this success, as the article makes clear, it must be observed that the soil tested was a homogeneous sand deposit, which gave exceptionally simple and definite elastic reactions. In soils having more complex elastic properties, and particularly in

stratified soils of varying characters, the certainty of correct interpretation may be quite doubtful. This probably is the reason for the considerable number of successive resistance-measuring devices that European practice has evolved; these have all recorded only partial success because the resistances which they disclosed could not be translated with assurance into measures of settlement under load. Fuller study may show that such soils can be investigated as successfully as simple sands. Tests now in progress at Dr. Terzaghi's laboratory in Vienna, we understand, are counted upon to advance this possibility a long step toward practical application.

Economic Factors

SOME recent census figures on irrigation afford a new illustration of the ever-present action of economic forces on engineering work. In ten years, it appears, the irrigated acreage increased 23 per cent in Arizona but decreased 13 per cent in Idaho and Nevada. The decreases are the result of natural selection: lands of marginal quality, occupied by marginal farmers, were eliminated because they could not support the cultivator. It is now well known that through overoptimism or lack of knowledge much unfit land was included in most irrigation projects, and it has also been observed that the poorest farmers gravitate to this land, where they do little more than raise crops of discontent. The wastes resulting from the inevitable weeding-out process place a heavy burden on the good lands and farmers and have brought many a project to misfortune. Fortunately the economic factors are better recognized today, and not only engineering feasibility but also soil and marketing considerations receive attention in planning irrigation. It remains to make general application of prequalification of settlers, already practiced by the Bureau of Reclamation and worthy of universal adoption. Good engineering without good economics cannot make irrigation successful.

Smoke

CONTROL of the smoke nuisance is giving way to its entire elimination. The reduction in intensity of the health-promoting ultraviolet or short rays of sunshine by atmospheric pollution is being recognized as a health problem to such an extent that highly scientific methods of measurement of the strength of these short rays have been developed and applied in various cities. The problem is being warmly discussed in foreign countries, particularly in England, where those who attempt classification put the more highly industrialized cities in the less healthful class. With definite measurements come yardsticks by which rational classifications may be made. Baltimore loses 50 per cent of the solar ultraviolet light as determined by active methods, and New York by the photo-electric cell has found a loss of 50 per cent of visible light without reference to the ultraviolet light. Better combustion helps visibility but effects little improvement in respect to ultraviolet rays. An increased amount of ash dust, quite opaque to ultraviolet light, results from the more complete combustion by forced draft to burn the sooty and tarry matter which produces the visible smoke. Promoters of central steam-heating plants, gas heating and electric heating can utilize the health argument to good advantage to offset the higher cost. Engineers in planning for the city of tomorrow, it seems, should aim for the smokeless city.

About Highway Centralization

A NEW statute of North Carolina places all roa under the state highway commission. By the la counties will have no part in the administration financing of highways. The state becomes the so governing body for public roads outside of municipalitie receives and distributes all highway funds and determin all road locations, changes and abandonments.

In its new act North Carolina has taken the final ste in centralizing the administration of highways, short o the nationalization of interstate roads. Its action, more over, is particularly significant because it expresses a growing sentiment among Southern states. Virginia, Tennessee and Georgia are looking ahead along the path of state consolidation or have tentatively set foot upon it. It may be expected that the movement will extend in states where the autonomy of the county and the township is not jealously regarded.

It may well be asked what the change portends. To what extent will centralizing highway authority be of public benefit? Shall township control be taken over by the county or shall all authority be given to the state? Or perhaps shall the nation be the one unit of administration?

The argument for centralization has force. County and township units have shown inability to cope with the financial and engineering problems of highways to meet modern traffic demands. Little change for the better can be expected from the township; it can bid but little for ability in highway officials, and has small means from which they can build up improved road systems. The situation of the counties is better. Many counties have highway administrations which compare favorably with any offered by states. In general, however, county road management is not able or efficient.

Is the true path of reform toward elimination of local administrative units or toward correction of their weakness? The answer is important. Centralization has objectionable features. It is likely to be unresponsive to local needs. It removes from the unit the right to exercise enterprise in highway development and makes it a petitioner to bureaucracy for the satisfaction of its legitimate aspirations. It takes from the community its desire to control its own tax expenditures. It builds up a government machine that in autocratic or radical hands is dangerous to public rights in government.

Complications confront any undertaking to correct the weaknesses of local units in their road administration. The township generally is too small to be a competent and effective administrator. Its road authority could better be merged in the county. The county can be made an efficient unit; very many counties are highly efficient, and these are not exclusively the rich and populous counties; indeed, some of them classify at the other extreme. The county is close enough to the township not to be out of touch and sympathy with its road needs. It is large enough to organize and equip highway improvement economically, if told how. Today the average county is weak in handling its highway tasks, because of lack of knowledge and wise advice, and not because it lacks money or is not spending money.

The question properly arises whether the state highway administration has not a more valuable service to render to local highway management than to take over the local roads. The last will not come about for a long time in many states. At the least, therefore, some other

plan than absorption might well be considered for these states. It is being found in some states in a combination of state aid, county and township funds, and a close liaison in an advisory capacity of the state highway officials with those of the county and township. The policy leaves interest in local roads in the community where it belongs, if enterprise, progress and knowledge in highway management are to be a possession of the people and not a dole from a sovereign hand.

Crossroads of Industry

CURRENT happenings give warning that industry is approaching a parting of the ways. Under the stress of business conditions some important industries are considering the abandonment of their hardly achieved group cooperation. Upon the decision hang issues of great magnitude: not only may these particular industries lose heavily but the sound course of industry as a whole is placed in jeopardy.

Two great industries, which over a period of years had developed well-planned and efficient cooperation through industrial or trade associtaions, are being led by bitter competition and internal realignments to deprive these associations of support, so that they are likely to wither into uselessness. There are indications that several other industries are nearing a similar crisis. The superficial causes of this development merely mask the fundamental cause—lack of adequate faith in the purposes of cooperation and lack of stamina to persevere against the pressure of strenuous times. What this new course will mean to industry is not hard to see.

For fifteen years or more industry has been learning that cooperation is the foundation stone of its stability and progress. It found that no single enterprise, however large or self-sufficient, can stand aloof from related enterprises. The welfare of the entire field is closely bound together. Consistently this experience became more emphatic as the forces of competition between rival industries grew more intense and as relations to government and to the public assumed greater importance. Out of it there evolved that modern tool of cooperation, the trade association. This tool has long since demonstrated its essential value, yet has only begun to take its rightful place in industrial life.

In guarding the interests of its industry in relation to other industries, government and public, the industrial association has carried out many important functions. *First*, it carries on promotion, or public education; *second*, it engages in technical development through research; *third*, it acts as central committee for standardization and simplification; *fourth*, it harmonizes conflicting or ill-adjusted business relations with suppliers and clients as well as among members; and *fifth*, it is the voice of the industry to public and government.

A long account would be needed to tell even in outline what such associations have accomplished by developing sound trade practices, by creating better technological methods, by developing new fields of use, by simplifying product, by fostering cost study and commercial stability, and by promoting open understanding of the industry's concerns with the public. Were merely the results of their research brought together, a fascinating story would appear. Yet it appears that these things, though well known to all industrial men, are in danger of being forgotten at the very time when they deserve to be most gratefully remembered. If such services are valuable in normal or prosperous times, they acquire a truly critical importance in times of severe pressure, for cooperation is more needed during stress and readjustment than it is when matters are going smoothly.

Beyond the present achievements of industrial associations lies the pregnant fact that these organizations have been the one great bulwark of industry against extensive governmental regulation and control. After the War there never was a time when any one industry stood so isolated from the commonwealth that its business was wholly its own concern. From railroads to wheat farmers, from cotton spinners to coal producers, all fields of industry were seen to be so clearly endowed with a public interest that their operations at all times were the direct concern of everyone. The public has come to believe that for its own security it must be assured of sound conditions within an industry, and that unless a competent spokesman can give such assurance governmental supervision will be necessary. The industrial association has begun to play the part of that spokesman, and its advance in this direction has been the most promising element of industrial relations in recent times. It may not prove to be a final or adequate agency to safeguard these relations, but it is the most efficient yet created.

On these facts rests the importance of industrial association work to industry as a whole. And because of these facts it is a matter of wide concern that leading industries, which have shown the way to effective development of cooperation, should weaken in their adherence to the system which they built and should allow their own cooperative work to become devitalized. Profound repercussion of such action on industrial cooperation in other fields is certain. Discouragement is notoriously infectious, more particularly under present conditions, and the bad example of one or two notable defections from the practice of cooperation will not remain without followers. Thus, industry as a whole is affected by the threatened events.

That managerial tempers should become short and impatient under the stress of difficult business is not remarkable. But it is startling to realize that this impatience can cause responsible executives to lose a sense of due appreciation of what they built up in long uphill labor and to court the loss of present service and future promise in cooperative work. For the industries directly concerned such a result means an immediate loss. Its effect on other industry, though less direct, may ultimately be even greater.

These developments call for sober thought. Each element of the industries concerned has reason to consider carefully the course to be taken. Is it prepared to go into a future built on the old-time basis of everyone for himself? Is it willing to suffer the loss of an aid that has been of fundamental value to its industry? Can it permit a single year's pressure to break down an essential service agency, one intimately bound up with industrial self-reliance and independence?

And so, also, every other industry faces the question of whether its own cooperative work is being placed in danger. Outstanding in the situation is the certainty that every industry faces the alternative of self-government or imposed government. Unless capable industrial associations are at hand to take leadership in self-regulation, extension of regulation and control by the public will be inevitable.

Fig. 1—Rapid-transit railway at Milwaukee, Wis.
Depressed part of line. Note articulated train of two cars mounted on three trucks.

Milwaukee's New Rapid-Transit Railroad

High-speed service provided for suburban districts by electric line on private right-of-way without grade crossings—Terminal subway to be built later

UNIQUE among rapid-transit systems is that put in operation in 1930 by the Milwaukee electric railway company as a supplement to its street-car system. The line, partly elevated and partly depressed, is on a private right-of-way without grade crossings, beginning at the edge of the business district and extending about 10 miles to and through residential districts. In the downtown section the rapid-transit cars operate at present on the surface tracks, but later there will be a subway with terminal loop in the heart of the city. The main purpose of the new line is to provide growing suburban sections with a real rapid-transit service, operated on schedule and free from the cumulative delays due to stops and halts of cars operated in public streets. Thus the running time on the rapid-transit line is now 12 and 30 minutes for trips of 5½ and 17½ miles respectively. Interurban service is benefited also by running the cars on the private right-of-way instead of on the street-car tracks. Furthermore, when the subway and loop are built they will take many cars off the downtown streets and so relieve traffic congestion. This line is notable also for having been planned and financed entirely by the electric railway company. —EDITOR.

IN THE construction of a rapid-transit line for electric cars on a private right-of-way extending to the border of the downtown district and free from grade crossings, the Milwaukee Electric Railway & Light Co. has taken a bold step to cope with the traffic situation resulting from the rapid development of high-class and medium residential districts at and beyond the west line of the city. On long street-car trips the cumulative delay due to stops for passengers and for crossing and traffic signals, as well as the slow speed and interference of other vehicles, may aggregate several minutes and make the total time inconveniently long and irregular for suburban passengers going to and from work. As it is impossible to reduce this delay, the alternative was adopted of providing a line on independent right-of-way without grade crossings, where only station stops would be made and fixed schedules with high speeds could be maintained. This new line also improves interurban services which have been hampered to an increasing extent by delays on the surface lines in reaching the city terminal station.

Rapid-Transit System—This development of a self-contained rapid-transit line was begun by the company in 1926 with the construction of an outlying double-track line on private right-of-way from a connection with the Clybourn St. surface line at 35th St. (which was then the western city line and 2½ miles from the center of the city) to connect with its Watertown interurban line at a point a little beyond West Allis, a distance of 5½ miles from 35th St. This extension, which cost about $1,600,000 for land and construction, was free from grade crossings except on 1 mile, which had to be laid in a city street. In 1927 this line was extended about a mile, at a cost of $300,000, to connect with the interurban line to East Troy and Burlington, Wis.

In 1928 another 1-mile stretch of the first section, which still remained in a public street, was transferred to a private right-of-way without grade crossings. With the completion of this work in 1928 the interurban cars to and from Watertown, East Troy and Burlington were able to operate over private right-of-way west from 35th St., which resulted in a material reduction of the running time.

An extension of the rapid-transit line east from 40th St. toward the center of the city was begun in December,

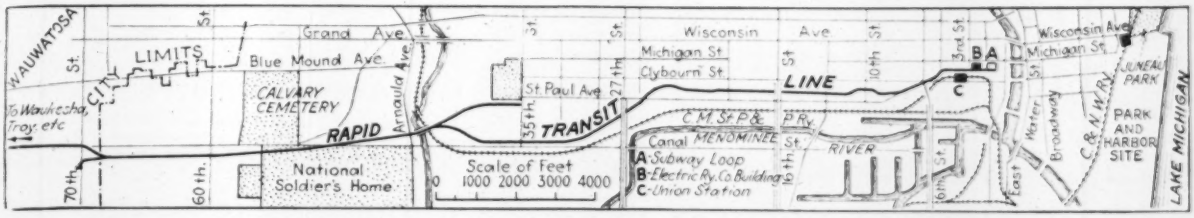


Fig. 2—New rapid-transit line, Milwaukee Electric Railway & Light Co.

1928, and is now completed as a two-track line to 8th St., 2½ miles, where the tracks are connected temporarily with a surface line of the street-railway system. A third track has been completed between 8th and 30th Sts. Eventually a subway will extend from 8th St. to a loop under the company's present terminal and office building in the center of the city, between 2d and 3d Sts. This eastern part of the rapid-transit line, built along the north side of the Menominee Valley and adjacent to a busy industrial district, eliminates all grade crossings as far as 8th St. and permits a reduction of five minutes in the running time from 40th St., giving a present schedule of four minutes for the 2½ miles between 40th and 8th Sts. With the saving in time on the entire route it is now possible to operate a 30-minute schedule between the business centers of Milwaukee and Waukesha, 17½ miles; and a twelve-minute schedule between West Junction and Milwaukee, 5½ miles. A train on the depressed part of the line is shown in Fig. 1, with plan and part profile in Figs. 2 and 3.

Grades and Curvature—Topographic and other conditions necessitate steep grades at some points, in order to pass over or under intersecting streets with the requisite headroom. The heaviest grades are near the city end of the line, where after passing under 13th St. the line has to rise at 4.56 per cent to cross over 10th St. Then the tracks temporarily cross 8th St. at grade and connect with the surface tracks at 7th and Clybourn Sts. Later the connection to the subway will begin at about 9th St., with a descending grade of 4 per cent. On other parts of the line there are grades of 2.5 to 3.75 per cent. In general the curvature is easy, especially for electric cars, but right-angled reverse curves of 60-ft. minimum radius are required for the connection with the surface tracks at 7th St. On one tangent there is a marked offset to avoid factory property which was held at a high price. It was considered advisable to bypass this property rather than to delay the project by litigation.

Grading and Bridges—Within the built-up part of the city some of the cuts and fills have concrete retaining walls, but farther out they have earth slopes which are dressed to 1 on 1½ and are sodded as protection against erosion. In some cases concrete toe walls are required to keep the fill or excavation within property lines. Heavy through and sidehill cuts are required in some places. The maximum depth of cut is 45 ft., and maximum height of fill, 30 ft. Excavation totaled 550,000 cu.yd., of which 120,000 cu.yd. was required for banks, the excess being used for filling a double-track pile trestle which was built in 1926 as part of the rapid-transit project.

Bridges carrying the railway over the streets are mainly plate girder and I-beam deck spans, all designed for Cooper's E-40 loading. They have open decks or floor systems and are painted with aluminum to give them a light appearance. There are a few pile trestles on the outlying part of the line, but these will be filled later or replaced with permanent structures. The high-speed city cars operated on this line weigh about 29 tons, interurban cars weigh 50 tons, and electric locomotives 50 tons. Bridges carrying streets over the railroad are mainly steel and reinforced-concrete structures.

In view of the heavy express business handled by the electric lines, the company has built a large express building, having tracks at two levels and with an eight-story portion, which has been leased to the General Electric Co. for warehouse purposes. Considerable additional freight traffic is expected to develop, and several industries along the new line have applied for spur-track connections.

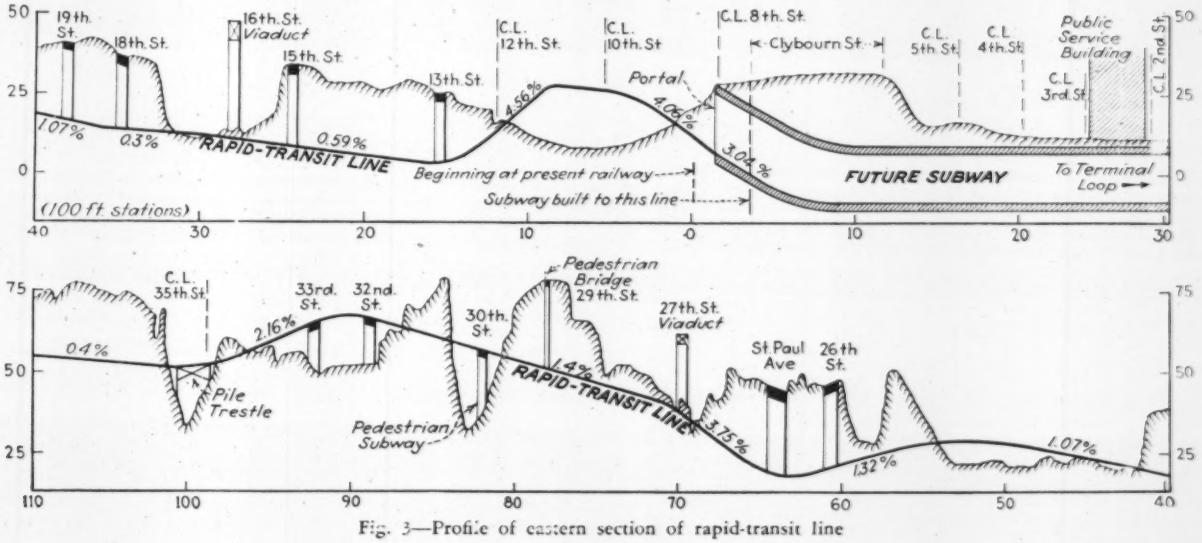


Fig. 3—Profile of eastern section of rapid-transit line

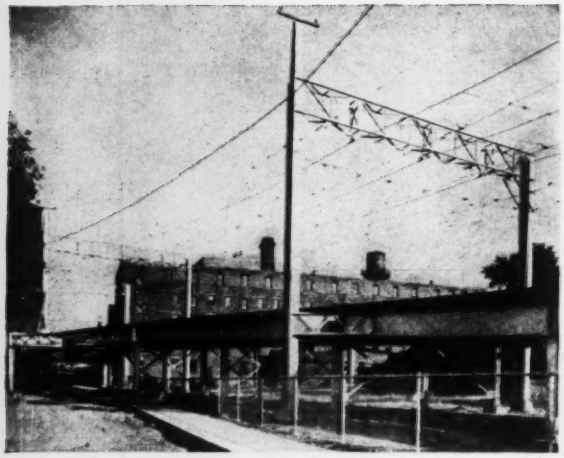


Fig. 4—Part of elevated line
The spans are of rolled girder-beams, not plate girders.

Elevated Structure—For approximately 600 ft. at its eastern end the line is carried on a three-track elevated steel structure (Fig. 4), giving a clear headroom of 14 ft. over the street. A special feature of this structure is that its longitudinal members are rolled girder beams of 35- to 50-ft. span, instead of the usual plate-girder members. These girders are supported on steel bents composed of box-plate girders and built-up steel columns, which are seated on concrete piers extending about 65 ft. below the street level. Track construction on this structure is of the open-deck type, while the overhead trolley system, of the catenary suspension type, is carried by steel-truss spans erected on the bents of the elevated structure.

For the four-track division the subgrade width is 54 ft. and 60 ft. for fills and cuts respectively, the latter including 8 ft. for the side ditches. On double track these widths are 27 and 34 ft. respectively. Tracks are spaced 12 ft. c. to c. Track construction consists of 100-lb. 39-ft. T-rails with six-bolt splice joints and spiked to creosoted oak ties on curves and untreated cedar ties on tangents, all ties being protected by tieplates. Broken stone ballast is 8 in. deep under the ties. Turnouts are of railway type with split switches and No. 10 frogs. On the four-track section the high-speed through tracks are in the middle, with island platforms at stations. The 16th St. station, under the viaduct crossing the Menominee Valley, is shown in Fig. 5. On sharp curves a heavy inside guard-rail is placed, consisting of a T-rail laid flat with its web supported on cast-iron chairs riveted to special tieplates supporting the track rail. The head of the guard-rail is toward the track rail and gives a flangeway of adequate width for railway wheels of M.C.B. standards.

From 8th to 27th Sts. the overhead wiring is carried by steel spans approximately 250 ft. apart. This section of the line has the catenary suspension system for three tracks, the trolley wires being supported at 15-ft. intervals by hangers from the catenary or messenger cable, which serves also as a feeder to the trolley wire. Beyond 27th St. the overhead system is of the two-track direct suspension type, but this will be changed later to the catenary system. Automatic block signals of the color-light type are used.

Terminal Subway—The subway with its terminal loop, having a length of about 3,500 ft., will be a rectangular structure for four tracks and mainly with shallow cover, but having a maximum depth of 30 ft. of cover. At the portal end, as now built for about 200 ft., it consists of a concrete bearing wall and a row of steel columns 4 ft. apart longitudinally, carrying roof girders and a concrete slab. This construction is for two tracks and will be widened later, the columns being then in the middle. However, the details of the design have not been settled definitely, nor has it been decided yet when the subway construction will be undertaken.

Engineering, Construction and Finance—In the construction work, done mainly by the company's forces, not only heavy grading but also numerous changes to water and gas mains, sewers and electric conduits were involved. Where the railway cut intersected a street the sewers and water pipes were generally carried under the subgrade by siphons, which had to be built before excavating for the right-of-way. Electric conduits are carried usually under the street bridges, and on one bridge a water pipe is carried in a similar manner.

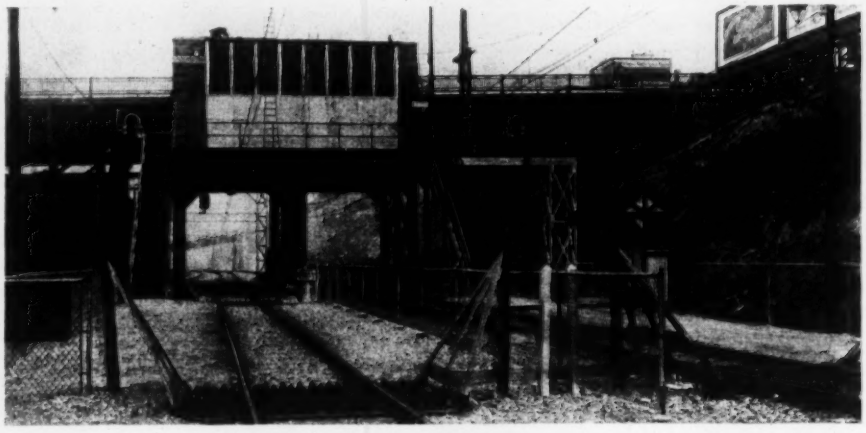


Fig. 5—Station at 16th St. viaduct
Electric substation on bridge over tracks.

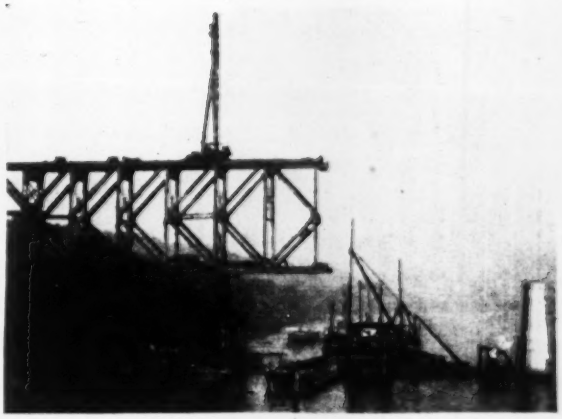
During construction gas mains were sometimes carried temporarily above the street level at a height sufficient to clear the steam-shovel booms. This gallows-flame span consisted of vertical risers and a horizontal pipe supported by catenary suspension cables led from falsework towers. Steel bridges, concrete foundations, abutments and decks were generally handled by contract.

A special feature of this rapid-transit development is that it has been initiated, planned and financed entirely by the Milwaukee Electric Railway & Light Co., without aid from the city, and has been built largely by its own construction forces. Both the design and construction were carried out under the direction of the company's engineers and supervisory force. The total cost of the line from 8th to 40th Sts. is about $4,000,000, exclusive of the subway and right-of-way expenses. The line to 8th St. was opened to traffic on Sept. 22, 1930.

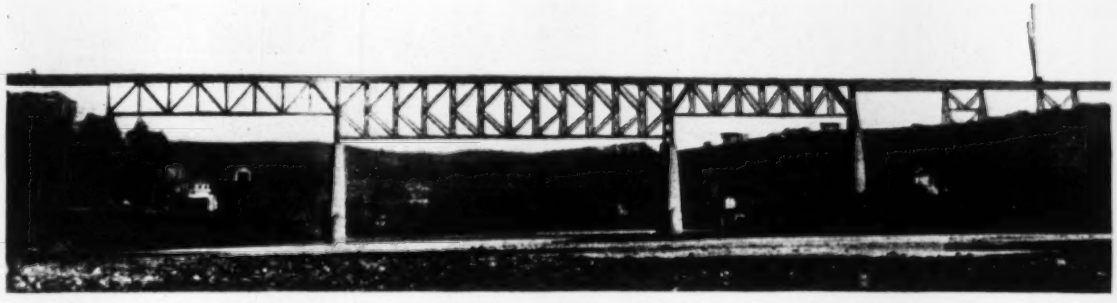
K-Type Bracing for Long-Span Bridge Trusses

Economies claimed over Warren or Baltimore bracing for trusses up to 450-ft. span on new P.&W.V. Railway line

TWO BRIDGES on the new 38-mile Connellsville extension of the Pittsburgh & West Virginia Railway Co. out of Pittsburgh, Pa., involve long and heavy trusses utilizing K-type bracing for their web systems. Although widely used as swaybracing in bridges and as bracing for viaduct and transmission towers, K-bracing has seldom been used in bridge trusses, the K-braced trusses in the approaches to the St. Lawrence River bridge at Quebec being the only ones of major importance in this country. The Pittsburgh & West Virginia bridges were developed quite independently of the Quebec bridge, however, being suggested in the first place by some K-braced towers in several of the viaducts on the new Connellsville line. When studies on K-braced trusses were first instituted by the railroad engineers, designs had already been made utilizing a modified Baltimore bracing, a divided Warren-type bracing and a straight Warren-type bracing.



Erecting K-braced trusses by guy derrick
View shows 350-ft. span of Monongahela River bridge.



Youghiogheny River bridge of P.&W.V. Railway in Pennsylvania

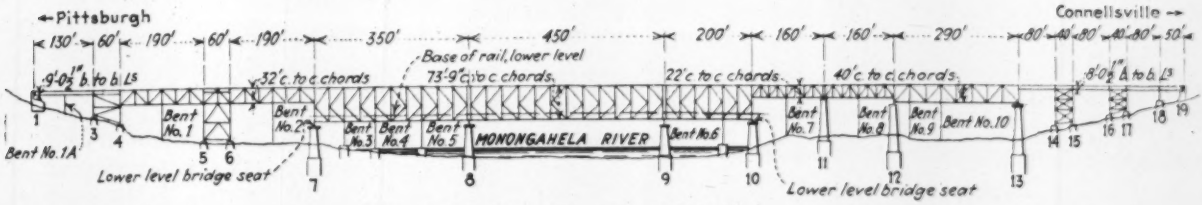
Estimates for these original designs now afford a means of evaluating the economy of the K-bracing used.

The two bridges on the line utilizing K-braced trusses are a single-track crossing of the Monongahela River, which involves three double-deck K-braced trusses of 200-, 350- and 450-ft. spans, and a single-track deck-truss bridge over the Youghiogheny River, with a K-braced span of 370 ft.

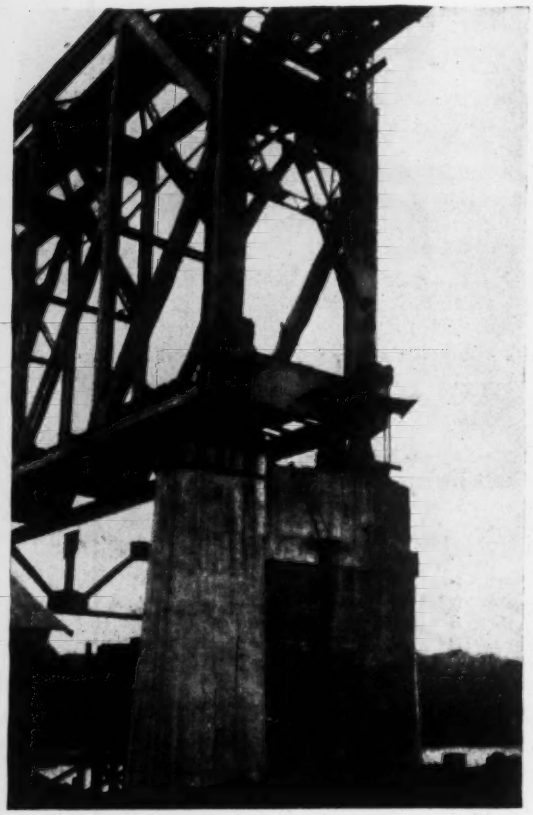
The accompanying illustrations of the Monongahela River bridge show that it is a structure of major proportions. The Pittsburgh & West Virginia Railway will use the upper level, while the lower deck is designed to handle ladle-car trains between two plants of the Pittsburgh Steel Co., which are on opposite sides of the river. The trusses are 73 ft. 9 in. deep and 25 ft. wide, center to center of chords. They were designed for Cooper's E-65 loading on two decks. The Youghiogheny bridge is designed for the same loading, but the K-trusses are only 61 ft. 8 in. deep.

According to A. N. Doud, bridge engineer of the Pittsburgh & West Virginia, who suggested the use of the K-braced trusses and designed the bridges, the advantages of the K-truss over other types are reflected in low secondary stresses and a reduced dead weight, being practically free of redundant members. These advantages result in an estimated saving of more than $20,000 on the Monongahela bridge. It is pointed out that K-bracing was used in the 200-ft. span of this bridge for appearance only and not because any economy was expected. The present studies indicate that a saving in weight, by using K-bracing, is possible only with spans of 350 ft. or greater. Most of the saving in weight on the long spans of these bridges occurred in the main members. In fact, the trusses are necessarily somewhat deeper than would have been required if Warren or Baltimore bracing were used, and the panels are approximately half as wide, so that more steel is required in the web system of a K-braced truss. The steel in the details was about 27 per cent, somewhat less than for the other types.

Because of war department requirements that no


Pittsburgh
Connellsville
130' 60' 190' 60' 190' 350' 450' 200' 160' 160' 290' 80' 40' 80' 40' 80' 50'
Base of rail, lower level
73'-9" c. to c. chords.
32' c. to c chords
22' c. to c chords.
40' c. to c. chords.
Bent No. 1A
Bent No. 1
Bent No. 2
Bent No. 3
Bent No. 4
Bent No. 5
MONONGAHELA RIVER
Bent No. 6
Bent No. 7
Bent No. 8
Bent No. 9
Bent No. 10
Lower level bridge seat
Lower level bridge seat

Monongahela River bridge of P.&W.V. Railway Co.



Lower deck portal of Monongahela River bridge

P.&W.V. railway line crosses on top deck. Lower deck used by ladle-car line of local steel mill.

obstructions be placed in the main channel of the river at the site of the bridges, the 450-ft. span of the Monongahela crossing and the 370-ft. span of the Youghiogheny crossing had to be erected as cantilevers, temporarily tieing the chords of these spans to the chords of the adjacent spans. This method of erection made necessary some additional steel, so that the actual saving over other types of braced trusses might have been more under more favorable conditions of erection.

The Connellsville extension of the Pittsburgh and West Virginia Railway Company was built under the direction of H. H. Temple, chief engineer, and F. L. Riddle, engineer of construction. Erection of the bridges was by the American Bridge Co., which used the recently developed guy-derrick erection method described in *Engineering News-Record*, Aug. 28, 1930, p. 318.

Deck Arch Railway Bridge Over the Nile

A 260-ft. steel arch bridge over the River Nile at Jinja, near Lake Victoria, extends railway communication from Mombasa, on the east coast, to the important interior town of Kampala, in the western part of the Province of Uganda. The bridge is of the spandrel-braced type, with railway deck above the crown of the arch, but a suspended deck carries a 20-ft. roadway and two sidewalks. The road and railway are 35 ft. and 69 ft. respectively above flood level. A 100-ft. deck truss at each end carries the railway over the road approaches. The present railway is of meter gage, but the bridge, opened in January, is designed for the 3½-ft. gage which is used extensively in Africa.

Overcoming Taxpayer Resistance To Public Improvements

Statements of annual per capita costs likely to mollify opposition based on sum-total estimates

TAXPAYERS will offer less opposition to public improvement projects when they are given full information as to what will be their individual charges and what benefits are to be obtained from such improvements, said E. E. Smith, superintendent of the Sanitary District of Elgin, in a paper before the Illinois Society of Engineers. A summary of his statement as to the Elgin sewage-works, put in operation in 1927, presents interesting figures. —EDITOR.

TAXES collected for the Elgin Sanitary District for six years average $3 per capita per year, based on a population of 35,000. They are expended to cover fixed charges, construction costs, operating expenses and organization overhead. The total annual cost per capita is $2.40. The difference of 60c. represents new construction work, and it is expected that a similar amount will be required anually to meet the cost of replacements and extensions.

Construction costs up to May, 1930, amounted to $950,889, or $27.17 per capita, as follows: sewage-collection system, $476,620 ($13.61); sewage-works, $378,275 ($10.81); land, $12,789 (37c.); engineering, $83,205 ($2.38). The collecting system includes intercepting sewers and three pumping stations with pumps of eleven sizes. The treatment plant consists of a grit chamber, four Imhoff tanks, trickling filters of 1.54 acres and 8 ft. deep, two secondary tanks, sludge pumps and pumphouse, twelve sludge beds with track and locomotive, and a two-story office building. Land was acquired for the treatment plant and pumping station. Engineering services include consulting, district and assistant engineers, inspectors and all equipment. The per capita cost of $27.17 compares with that of other similar works in Illinois as follows: Urbana-Champaign, $18.20; Aurora, $24; Peoria, $26.80; Rockford, $28.80; Decatur, $32.20; Springfield, $33.85.

The intercepting sewers are constructed for a population of 75,000, which at 246 gal. per capita gives a daily capacity of 18,500,000 gal., or a cost of $25,800 per million gallons. The treatment plant, designed for 37,500 persons at 88 gal. per capita, or 3,300,000 gal. daily, has a cost of about $114,600 per million gallons. Annual operating costs, exclusive of power, are about $17,000, or 49c. per capita. The total cost of treatment per million gallons is $19.48, divided as follows: operating expenses, $11.80; electric power, $5.42; organization overhead, $2.26. In addition, fixed charges amount to $38.60 per million gallons treated. With the average daily flow of 3,963,000 gal. the daily operating cost for treatment is $77.20, not including fixed charges. Finally, the sum of fixed charges and operating costs per capita per year is $2.40; or $1.60 for fixed charges (bonds and interest), 49c. for operating expenses, 22c. for electric power, and 9c. for organization overhead.

Mr. Smith considers that, having such data before them, few citizens would hesitate to invest $3 per year if it would insure the cleaning up of streams, the betterment of health conditions and the proper disposal of sewage and wastes instead of dumping them upon communities downstream.

Steep Incline Railway Built Down Side of Royal Gorge

Construction of cableway on 38½-deg. slope from suspension bridge to bottom of canyon more difficult job than building of bridge

THE construction last summer of a two-track cable railway, 1,500 ft. long on a 38½-deg. slope down the north side of Royal Gorge in Colorado, equaled in cost and proved to be a far more difficult job than the erection of the suspension bridge across the gorge at the same site (*Engineering News-Record*, June 5, 1930, p. 922), both structures being designed and erected by the same firm. From the rim of the canyon, near the north anchorages of the suspension bridge, the incline drops nearly 1,000 ft. down through a narrow gulch in the side of the gorge, ending just above the D.&R.G.W. Railroad track at the east end of the famous Hanging Bridge, which carries the track through the narrowest part of the canyon.

Loose rock on the sides and bottom of the steep gulch and the location of the main-line railroad track at the foot of the slope made the work of constructing the incline both difficult and dangerous. Extreme care was used by the contractor at all times, and only once, during a heavy storm, did enough rock fall on the track to block rail traffic. All work was stopped some time before the passage of a train.

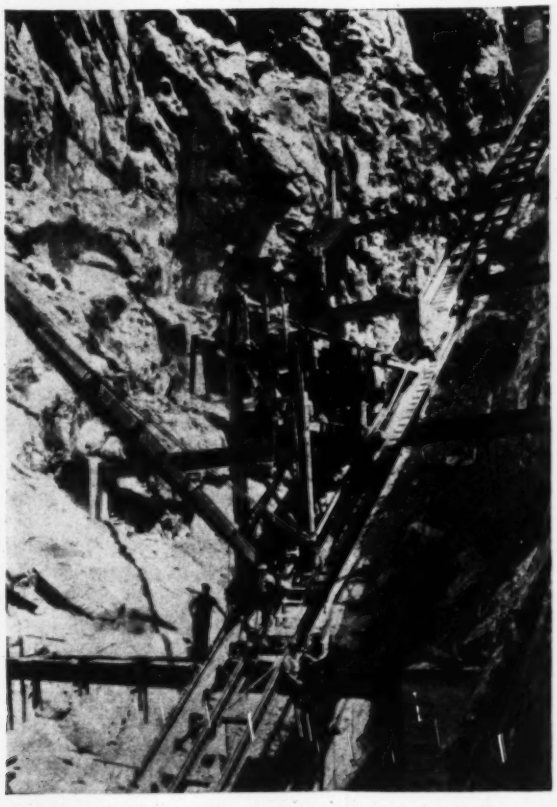


Fig. 1—Steel erection traveler, Royal Gorge incline

Note varying length of crossbeams and method of supporting. Concrete car can be seen behind traveler. Concrete chute passes beneath traveler.

Fig. 2—View of completed section of incline looking down the gulch

Middle rail is common to both tracks except at passing point.

The incline will serve as another means of viewing the scenic attractions of the gorge and will be used mostly by those driving to the top of the canyon. Arrangements have been made whereby through passengers on the D.&R.G.W. may leave the train at Colorado Springs, take a bus to the top of the Royal Gorge, descend on the incline and catch the same train at the Hanging Bridge, or vice versa.

Design—The incline consists of a double-track structure 1,480 ft. long on a 38½-deg. slope, giving a rise of 921 ft. At the bottom the tracks end at the top of a rock-faced reinforced-concrete retaining wall 25 ft. high and 70 ft. long built alongside the railroad track. A stairway leads from the lower loading platform to the railroad level. The incline structure is made up of three longitudinal 10-in. 25.4-lb. I-beam stringers resting on crossbeams spaced 30 ft. center to center on grade, the stringers spaced 3 ft. 1⅞ in. center to center and each carrying one 40-lb. railroad rail. The center rail is common to both tracks except at passing points. Fig. 3 shows details of the structural design. A feature of the design is the fastening of the rails to the stringers by continuous welds, no bolts or rivets being used. Crossbeams vary in size according to length, some of them reaching 70 ft. The ends of the crossbeams were seated in pockets drilled and blasted out of the sides of the gulch wherever possible; otherwise the beams rest on concrete

pedestals or steel bents. Where the beam ends are in rock pockets they are sealed in concrete. The longitudinal stringers are braced every 6 ft. by 7-in. channel laterals and by angle-iron crossbracing.

Two 3-ft.-gage passenger cars are used, each having a capacity of 21 persons arranged in seven seats, as shown in Fig. 4. The seats are completely inclosed with heavy wire mesh and the doors are located on the side of the car at one end of each seat. A heavy corrugated sheet-metal roof protects the passengers from possible falling stones. Each car is equipped with two $\frac{3}{4}$-in. hauling cables and one $1\frac{1}{4}$-in. safety cable, the latter controlled by a solenoid brake in the operating house. The cars are also equipped with a heavy hook to drop over the crossbeams in case all other safety measures fail.

The hoisting equipment consists of a regular worm-drive elevator hoist, the worm gear acting as a further safety precaution should the solenoid brake fail to act if the power is cut off. Hoisting power is supplied by a 60-hp. electric motor operating at 550 r.p.m., giving the cars a speed of 250 ft. per minute. All hoisting machinery is located in an attractive stone house at the top of the incline.

Construction—Excavation was the most difficult part of the construction work. Not only did the narrow gulch have to be widened and straightened at various points but great quantities of loose rock had to be cleaned out of the bottom and scaled off of the sides. About 30,000 cu.yd. of rock was removed, all taken out down the gulch and over the railroad track.

The first step was to build a retaining wall across the bottom of the gulch to protect the railroad track, and the space behind the wall soon filled up with loose material. As the top of the wall is 25 ft. above the track, rocks rolling down the gulch bounded out from the wall into the river, clearing the track. From the wall a timber chute was built over the track to handle the excavated material

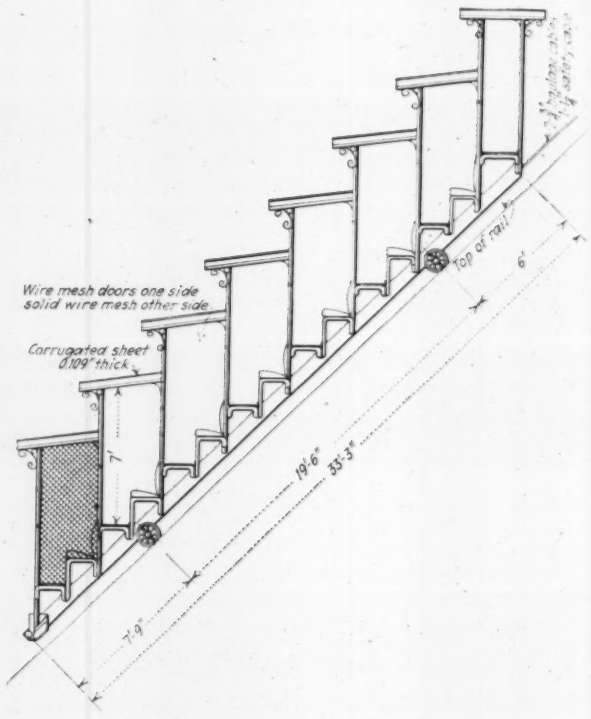


Fig. 4—Sketch of car used on incline

Two identical cars used, one counterbalancing the other.

brought down under control. A slackline cableway bucket, operated from below, helped pull the excavated material down to the chute, and the spoil was then sluiced through the chute into the river beyond the track. The strong current of the river washed the excavated material away, requiring no further handling. Scaling loose rock off the sides of the gulch and drilling for blasting was precarious work; many times the workmen had to suspended in slings to reach the working point. Slides and falling rock constantly harassed the crews, and several men were injured during construction, though none was hurt fatally.

Steel erection was started from the top and completed one bay at a time, the concrete work keeping just ahead of the steel. The steel was placed by a traveling crane, seen in Fig. 1, the members being brought down to the crane on a work car handled by a hoist on top. The exact length of the crossbeams could not be determined until the bearing pockets had been excavated into good sound rock, and many of the beams were cut to length on the

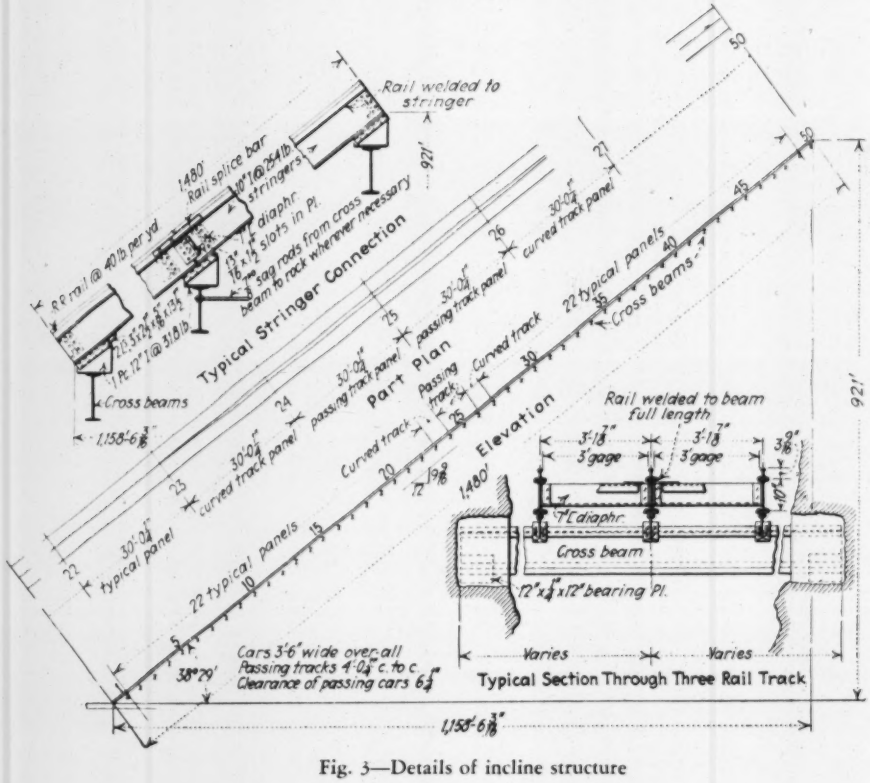


Fig. 3—Details of incline structure

job by means of torches. All field connections are bolted.

Quick-setting cement was used in all concrete for pedestals and for backfilling the crossbeam pockets. The mixer was set on the top of the incline, which offered an excellent opportunity for seeing just how far concrete made with quick-setting cement could be successfully chuted. It was found that 400 ft. was the maximum distance the concrete could be conveyed in chutes, for beyond this distance the mix separated to such an extent that obtaining good concrete was impossible. Concrete was brought to the end of steel in a 1-cu.yd. bottom-dump bucket set on the work car and was then chuted to final location.

The incline was built at a cost of $225,000 by the Royal Gorge Bridge & Amusement Co., which also built and operates the suspension bridge. It was designed and built by George E. Cole, engineer and contractor, Houston, Tex.

Calculating Floodflow Over an Embankment

By ALBERT S. FRY and G. H. HICKOX
Morgan Engineering Co., Memphis, Tenn.

CALCULATION of the flow of floodwater over a railroad embankment was the most important element in a problem which arose after the 1927 flood on the White River in Arkansas (Fig. 1). The Missouri Pacific Railroad then proposed to raise its tracks above flood level, which involved flood heights at Newport, Ark., a leveed town of 8,000 population at the north end of the proposed raise. This unusual problem was of importance to the town on account of flood dangers and to the railroad on account of the heavy construction and maintenance of trestles in place of earth embankments.

Immediately south of Newport the railroad extends across the valley on embankment and trestles or bridges for a distance of about 10 miles to the higher lands on the opposite side, as shown by Fig. 2. The flood of May, 1927, the greatest on record, overtopped the railroad for the greater part of this distance and flowed over it for about six days. The water washed holes of varying depth in the subgrade, carried away the ballast in places and also washed track off the embankment.

Newport is entirely protected by earth and concrete levees, which have successfully withstood all floods, including that of 1927. In its original position the railroad embankment headed up ordinary floods, which did not overtop it until the existing openings would pass the discharge. During the great flood of 1927, which overtopped the tracks, the railroad headed the water up a greater amount, but since the tracks were several feet below the level of the top of the levee, the embankment served as a long relief spillway.

With the tracks raised to the proposed level above the top of the levee, this spillway capacity would disappear, and in order not to change flood heights at Newport sufficient openings were required through the new embankment to pass floods against which the levee system had formerly protected the town. In negotiations between the Newport Levee District and the railroad it was agreed that with the railroad in its original position the levees protected Newport against floods up to 1.4 ft. higher than the 1927 flood and that sufficient trestle openings should be provided through the raised embankment for 4 miles south of Newport to pass the discharge that would occur over and through the original embankment with a water surface 1.4 ft. higher than in the 1927 flood, with no increase in the height of such a flood due to the raised track.

The amount of trestle required in the 4-mile length to pass this flood was estimated by the Morgan Engineering Co., as engineer for the levee district, at 8,800 ft. and by the railroad engineers at 3,500 ft. As contracts were left for raising the track and it was necessary to fix this trestle length without delay, the levee district and the railroad agreed to submit the question to a board of engineers for arbitration. This board, consisting of S. H. McCrory, Anson Marston and Daniel W. Mead, rendered a decision requiring 6,513 lin.ft. of trestle.

Fig. 1—Floodflow over railroad embankment

White River flowing over Missouri Pacific Railroad near Newport, Ark., April, 1927. Crest of flood was 0.8± ft. higher than when picture was taken.

The most important and the most uncertain element in the problem was the quantity of discharge over the track. Data had been collected after the flood to establish the upstream and downstream high-water elevations, the depth of overflow, amount of washouts and condition of track and embankment. But experiments upon which discharge calculations could be based were lacking. Soon after the decision was rendered experiments were begun at the University of Iowa's hydraulic laboratory to determine formulas for discharge over railroad embankments under conditions similar to those which occurred in the White River valley. The experiments were made by David L. Yarnell, senior drainage engineer, U. S. Bureau of Public Roads, and Floyd A. Nagler, professor of hydraulic engineering, University of Iowa. The results, as a valuable contribution to hydraulic engineering, were published by the bureau in its *Public Roads*, April, 1930.

These experiments furnish a basis for a recalculation of the flood discharge over the embankment. In the original calculations the levee district engineer employed the formula for a broadcrested weir, $Q = CLH^{\frac{3}{2}}$. Personal observations and photographs of the flood (Fig. 1) indicated the behavior of flow as that of a broadcrested weir. On account of irregularities in the embankment

WHITE FIVER FLOOD DISCHARGE, 1927

	Original Estimate of District Engineers, Sec.-Ft.	New Estimate Using Iowa Experiments, Sec.-Ft.
Overtrack flow:		
Section 4 miles south of Newport	104,000	120,000
Balance of valley	125,000	151,000
Flow through trestles and washouts	121,000	121,000
Flow through main bridges	160,000	160,000
Total discharge	510,000	552,000

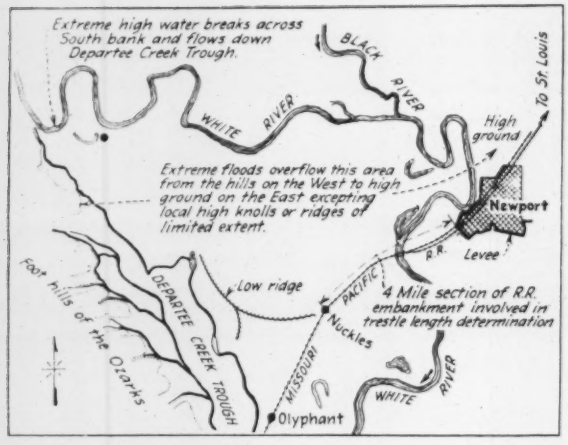

Extreme high water breaks across South bank and flows down Departee Creek Trough.
BLACK RIVER
WHITE RIVER
To St Louis
High ground
Extreme floods overflow this area from the hills on the West to high ground on the East excepting local high knolls or ridges of limited extent.
Newport
Levee
Low ridge
PACIFIC
4 Mile section of R.R. embankment involved in trestle length determination
Foot hills of the Ozarks
DEPARTEE CREEK TROUGH
Nuckles
MISSOURI
WHITE RIVER
Olyphant

Fig. 2—White River Valley near Newport, Ark.

which disturbed the flow, a low coefficient of discharge, $C = 2.64$, was used.

The experiments not only confirm the use of the broadcrested weir formula but also indicate the use of higher coefficients, ranging from 0.70 to 3.27 for the flow conditions encountered, the value depending on the degree of submergence. In many places the downstream water surface was higher than the embankment, completely submerging it. The degree of submergence was taken as the ratio of downstream head to upstream head, both heads being measured from the crest of the embankment. Where this submergence was less than two-thirds, the discharge as originally computed was not reduced, since theoretically there is no reduction in discharge over a broadcrested weir up to submergence of that amount. The Iowa experiments substantiate this theory, as they show that for values of submergence less than 0.6 "The coefficient was practically constant since the elevation of the tailwater had no effect on the height of the headwater. This was due to the fact that the critical velocities occurred at the downstream edge of the embankment."

For comparative purposes the 1927 flood discharges over the track have been recomputed, using the coefficients determined by the Iowa experiments, as shown in the accompanying table. Here the overtrack flow is shown to be about 18 per cent greater than determined by the original calculation. Adding the flow through trestles and main river bridges, which are constant in both cases, the total 1927 discharge is 8 per cent greater than previously determined. Fig. 3 shows typical conditions of flow over the embankment.

The total discharge for the 1927 flood is 552,000 sec.-ft., or 27.6 sec.-ft. per square mile for the 20,000-square mile drainage area above Newport. Most of this drainage area lies in the Ozark region of Missouri and Arkansas where the surface slope is steep and precipitous, and a high runoff is to be expected.

Raising the track across the entire valley was first proposed, but this was reduced to a section about 4 miles long immediately south of Newport, when the interests of that town rather than of the entire valley were considered. Applying the new experimental coefficients, the discharge (exclusive of the main river bridges) of the flood agreed upon for fixing trestle lengths, which is 1.4 ft. higher than in 1927, is 316,000 sec.-ft. for this 4-mile section. The estimate of the Morgan Engineering Co., which was higher than those of the board of engineers and the railroad engineers, was 293,000 sec.-ft.

A second important element in fixing the new trestle length is the flow through pile trestles, since all the flood discharge (except at the main river bridge) must flow through structures of this type in the raised embankment. Records were available in velocity and discharge measurements made by the U. S. Geological Survey and levee district engineers for lesser floods than 1927, with observed differences in water level on the two sides of the track. From these a relation between velocity and head loss was determined. For single-track and double-track trestles the head loss under the existing conditions was found to be $H = 0.15V^2$. Although these formulas fit the conditions of flow encountered at the White River

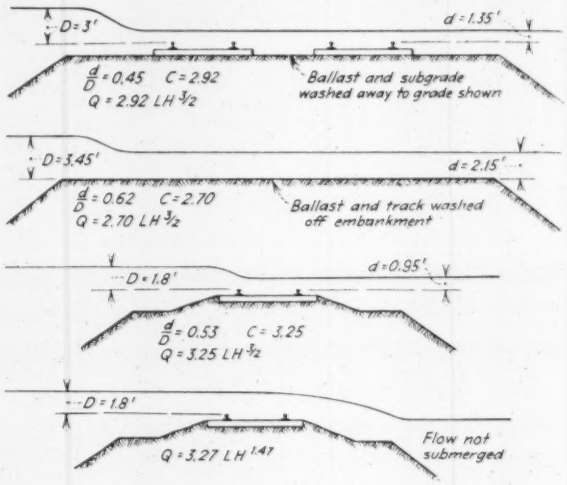


Fig. 3—Typical conditions of floodflow

trestles near Newport, they are not believed to be generally applicable. Losses should be less under more ideal flow conditions.

The following engineers of the Morgan Engineering Co. were associated with various phases of the problem: L. L. Hidinger, N. H. Sayford, F. W. Truss and the writers. Engineers representing the Missouri Pacific Railroad included E. A. Hadley, chief engineer; W. M. Neptune, principal assistant engineer, and G. W. Payne.

North Carolina Has Complete Atlas of County Highways

A complete atlas showing county roads in North Carolina has been completed by the state highway commission. The maps were compiled after a survey of county roads and the financial operations of local road authorities in which the state highway and tax commissions and the bureau cooperated. They are made on a scale of 1 in. per mile, and are perhaps the first complete county road maps for any state in the country. There are in all 100 maps, one for each county. The survey was begun about Aug. 1; field work was finished in October, and the maps were completed in less than six months.

Akron Sewage-Treatment Plant Costs Distributed by Units

Cost by structures obtained by extending the individual quantities by unit bid price for each item listed

By A. B. BACKHERMS
Sewerage Engineer, Akron, Ohio

IN BUILDING the $3,750,000 sewage-treatment works at Akron, Ohio, the structures and construction of which were described in *Engineering News-Record*, Nov. 17, 1927, p. 784, a contractual arrangment which made the city the responsible agent for the scheduled delivery of all construction materials necessitated very close control by the engineers and a particularly careful survey of costs. As the engineer in direct charge of construction and later as sewerage engineer for the city, A. B. Backherms accumulated records which seemed to be of such value that the editor of *Engineering News-Record* urged their compilation and summation for publication. This has now been done, and the results calling for many tedious hours of collection and classification are presented in the tabulations which follow. —EDITOR.

FOR MOST structures there are formulas that are universally used in rough-estimating the cost. However, while there have been many sewage-treatment plants constructed, very few usable costs have been published, except "total cost," which generally is without statement whether the figure represents net construction cost or whether it includes cost of design, engineering, land, office equipment, landscaping, etc. Most engineers connected with the design or construction of only one plant see no need of tabulating for further use the distribution of actual quantities of material and equipment to be later extended to obtain cost distribution.

Soundness of the Figures Presented

There are several methods of quickly rough-estimating the cost of a plant by applying a multiplying factor to the quantity of sewage to be treated, or to the population to be served. Unless the multiplying factor takes into account the type of plant, the varying degrees of treatment, cost of land, engineering, etc., the total estimated cost will obviously be subject to gross error. However, if the factor is known for each unit of the plant, only such units as are to be considered in a proposed plant will be used, and the resulting preliminary estimate will be more nearly correct as the variables and most of the uncertainties are eliminated.

How accurately the factor can be determined is illustrated in Table I, in which comparison is made of four similar plants constructed in recent years, all having the same degree of treatment and consisting of racks or screens, grit chambers, Imhoff tanks, sprinkling filters, sludge beds, secondary settling tanks, administration building, garages and machine shop. Plants *C* and *D* each have a pumping station, the additional cost of which is partially offset by corresponding reduction in excavation and concrete for other structural units. Inasmuch as the total cost depends, to a large extent, upon the design capacity per capita for each unit, and also since the total cost of filters represents between 40 and 45 per cent of the entire cost, the slight variation in the per capita cost in the table can be explained by considering the designed rate of operation, or loading, of the filters, which relatively are in the same order, and as follows:

A—2.0 m.g. per acre per day, or 1,730 persons per acre-foot
B—2.36 m.g. per acre per day, or 1,860 persons per acre-foot
C—3.30 m.g. per acre per day, or 2,860 persons per acre-foot
D—5.00 m.g. per acre per day, or 4,670 persons per acre-foot

Thus it can be seen that with sufficient cost and design, per capita data, the total cost of a plant for any degree of treatment or loading, can be readily estimated.

Method of Assembling Akron Costs

Bids for the Akron plant were divided into a number of contracts: contract 1, covering the construction of the plant, the placing of materials and installation of equipment; and contracts 2 to 14, covering the delivery of materials, equipment and appurtenances.

The significance of this arrangement was commented upon in *Engineering News-Record*, Nov. 17, 1927, p. 783. This form of contract required an unusual degree of coordination between the constructor and engineers and made the city responsible for prompt and timely delivery of certain materials and all the equipment to be installed. This responsibility was anticipated, and prior to commencing work the contractor was required to submit a schedule of construction sequence and progress from which the engineers scheduled the delivery of material and equipment, which the city had to furnish.

Miscellaneous Records—The usual log book was kept along with weather records, river gage readings, engineering force, contractor's and subcontractor's daily working force, carloads of material received by the contractor and delivery of materials and equipment under contracts 2 to 14, production record of concreting plants, progress chart and sheets and estimates prepared.

Estimates—For contract 1, estimates were to be prepared once a month. However, by request of the contractor and sanctioned by the board of control, estimates on the general contract were made twice a month

TABLE I—COMPARISON OF TOTAL COST AND COST PER MILLION GALLONS AND PER CAPITA FOR FOUR SIMILAR PLANTS

Plant	Total Cost*	Average Capacity, M.G.D.	Cost per M.G.	Population	Cost per Capita
A	$3,500,000	28	$125,000	242,000	$14.5
B	3,644,000	33	110,500	260,000	14.00
C	525,000	4.62	113,800	40,000	13.15
D	3,425,000	30	114,200	280,000	12.25
Average			$115,875		$13.75

*Total cost figures include all construction and equipment cost but exclude cost of land.

TABLE II—DISTRIBUTION OF COST BY STRUCTURES AND UNIT COST PER MILLION GALLONS AND PER CAPITA

Plant Unit		Unit Cost—Per M.G.	Unit Cost—Per Capita
[1]Detritus tanks and buildings	$99,997.84		
[1]Fine screens (Dorr)	14,640.00		
[1]Clarifier equipment (Dorr)	12,410.00		
[1]Pumps	2,835.00		
[1]Conveyor equipment	3,882.00		
[1]Valves	378.52		
[1]Sluice gates	10,609.50		
[1]Cast-iron pipe	2,254.51		
[1]Trav. hoist for grease beds	175.00		
[1]Siphon fee	250.00		
Total	147,432.37	$4,465	$0.567
Garage and machine shop	14,616.18		
Equip., lathe, forge, drill, press, welding outfit, compressor and misc. tools	3,500.00		
Total	18,116.18	550	0.070
Administration Building	38,162.52		
[1]Venturi meters, tubes and 48-in. control valves	13,101.35		
[1]Valves	26.62		
[1]Cast-iron pipe	760.44		
[2]Lab. furn. and equipment	5,187.80		
[1]Lab. suppl. and chemicals	5,000.00		
[2]Office and locker-room furniture	414.56		
[2]Ventilating fan and motor	77.95		
Total	62,731.24	1,900	0.241
Imhoff tanks	772,626.71		
[1]Sump pump (duplex)	1,775.00		
[1]Air compressor	1,222.42		
[1]Valves	19,751.15		
[1]Sluice gates	5,482.25		
[1]Cast-iron pipe	29,335.58		
[1]Recording thermometers	1,000.00		
Total	831,193.11	25,190	3.196
Sludge-drying beds	118,032.84		
[1]Cast-iron pipe	69.71		
Total	118,102.55	3,580	0.454
Trickling filters	868,260.07		
[1]Filter media	480,573.30		
[1]Valves	6,280.73		
[1]Sluice gates	3,102.10		
[1]Cast-iron pipe headers and misc. fittings	62,911.45		
[1]Cast-iron pipe lateral distributors	47,774.64		
[1]Nozzles (Akron type)	8,510.00		
[2]Dosing tanks	155,954.05		
Total	1,633,366.34	49,495	6.280
Humus tanks	199,092.37		
[1]Valves	1,119.84		
[1]Sluice gates	7,721.30		
[1]Turret nozzles	135.00		
[1]Cast-iron pipe	528.83		
Total	208,597.34	6,320	0.802
Humus pump house	6,429.93		
[1]Pumps	2,175.00		
[1]Valves	171.87		
[1]Cast-iron pipe	741.18		
Total	9,517.98	290	0.037
Bypass chamber	6,380.16		
[1]Sluice gates	931.60		
[1]Cast-iron pipe	109.31		
Total	7,421.07	225	0.029
Connecting conc. conduits	82,796.66	2,510	0.318
Relocated river channel	30,205.00	915	0.116
General plant items:			
[1]Tide gate	285.00		
[1]Cast-iron pipe (water mains, etc.)	14,122.08		
[1]Valves	840.70		
[1]Gasoline locomotive	2,050.00		
[2]Roads, dikes, grading, planting, landscaping and miscellaneous	142,595.49		
[2]Water tank and deep well pump and house	15,826.89		
[2]Heater for water pump house	107.00		
[2]Warehouse (frame)	4,668.30		
[2]Rocker dump cars (24)	3,500.00		
[2]Watchman clock system	80.00		
[2]Signal wall clock and siren	212.00		
[3]Additional industrial tracks	13,000.00		
[3]Automatic electric equipment for by pass and flood control	100.00		
[3]Crane	8,000.00		
[3]Sludge dump platform	2,500.00		
[4]Housing development	28,000.00		
[4]Incinerator and building	36,000.00		
[4]Imhoff tank screen	6,500.00		
[4]Gas-collecting system and appurt. for Imhoff tanks	22,060.00		
Miscellaneous items	660.43		
Total	301,107.89	9,120	1.157
Cost of engineering design and construction	193,105.27	5,855	0.743
Total cost of construction	$3,643,693.00	$110,415	$14.01
Cost of land, 834.54 acres @ $127.38 per acre	106,307.00		
Total cost of sewage-treatment plant	$3,750,000.00		

[1]Items represent the cost of equipment and material only, the cost of installation being included in the general contract.
[2]Items include cost of equipment and installation.
[3]Items have been deferred until required.
[4]Items are held in abeyance pending accumulation of data to determine actual provisions to be made.

and an 80 per cent allowance included for inventory of stock material on the job; and for all other contracts, once a month if delivery of material exceeded $1,000 (the exception being for filtering material, for which estimates were issued twice a month.)

The number and frequency of estimates necessitated keeping all records up to date. The inspectors were required to compute all quantities of materials placed, the computations being made on standard 8½x11-in. loose-leaf sheets, which were correctly labeled and extensions recorded in proper tabular form, with all information referenced and presented in final form. These data were transferred to the field office and posted daily.

In many instances the inspector's quantities or measurements were checked daily with the contractor's or subcontractor's, engineers or foremen, which closed the item and eliminated future disagreements.

Progress Reports—In order to expedite the preparation of estimates and reports and to obtain readily the required number of copies, form sheets for the progress report for the general contract and contracts 2 to 9 were printed on vellum transparent paper with item, item numbers, estimated quantities and the sheet columned and labeled with "structural unit" headings. The major columns were again subdivided in three columns for insertion of "previous period and to date" quantities.

In making an estimate the "total to date" quantities were transferred to the printed form in the estimate book, where they were extended to obtain the dollar and cents figures to be totaled for the estimate. The inventory items were included and carried at the bottom of the estimate at 80 per cent of invoice prices.

Estimates for miscellaneous contracts were taken directly from the progress report sheet, which carried the quantities and extended amounts.

Supplementary Contracts and Work Orders—Work not properly covered in the general contract was authorized on work order by the resident engineer when the amount of individual work did not exceed $100, or for larger amounts on a supplementary contract, which was approved by the chief engineer and the board of control. It is notable that for a job of this magnitude ($2,550,976.71), there were only nine supplementary contracts and fourteen extra-work orders, aggregating $6,070.59, or 0.237 of 1 per cent of the total contract.

Cost Distribution of Structures—The distribution of cost by structures is indicated in Table II and was obtained by extending the individual quantities by the unit bid price for each of the items listed in the respective columns, as shown on the final progress sheet. The distribution of contracts 2 to 14 was likewise obtained by taking the quantities, multiplied by the bid price for the material or equipment, which is entered in Table II opposite the respective material or equipment item.

Supervision—The design of the plant and preparation of plans and specifications were by city employees, with R. A. Allton, designing engineer, under J. E. Root, former sewerage engineer. The plant was built by the Walsh Construction Co., contractor, Davenport, Iowa, J. H. Gill, district manager, and was completed July 1, 1928. Construction engineering was also handled by the city under A. B. Backherms, resident engineer, who succeeded J. E. Root, Jan. 1, 1928, as sewerage engineer. The plant was placed in service Dec. 12, 1928, with T. C. Schaetzle engineering chemist in charge of operation. Metcalf and Eddy, consulting engineers, reviewed all plans and specifications and were retained for a period of one year on operation.

Concrete Mill Design Governed by Machinery Layout

Numerous storage bins and mill facilities involve special design—Winter concreting at high altitude

By EDMUND WILKES, JR.
Chief Structural Engineer, Jones-Hettelsater Construction Co., Kansas City, Mo.

EXAMPLES of the way in which predetermined machinery layouts may affect structural design of industrial plants, as well as examples of a variety of ways in which sliding forms may be used in concrete building construction, are afforded by the new plant of the Ralston-Purina Co., at Denver, Colo., for the manufacture of mixed feeds for cattle.

This plant (Fig. 1) consists of three main units built in contact or practically as one structure, together with subsidiary detached structures, including a two-story office building. These main units comprise: (1) a grain elevator headhouse 56x76 ft. in plan and 112 ft. high, surmounted by a cupola 74 ft. high; (2) a battery of fifteen grain tanks 18 ft. in diameter and 89 ft. high; (3) a feed mill 52x180 ft. in plan and eight stories high. All these structures are of reinforced concrete throughout, except that the mill has panels of red brick in the outside walls. The first two units were built with sliding forms above the foundations. As it is customary to use this type of forms for grain elevators and other deep bins, no unusual problems were presented in this part of the work. Concrete was first poured Jan. 26, 1929, and three months later the headhouse and tanks were complete, except for minor details.

Special Design in Mill—Both the design and the construction of the third unit or feed mill building were unusual, because the interior contains five groups of deep rectangular concrete bins of varying dimensions for holding grains and cereals. As the locations of these groups of bins were fixed by the layout of machinery and spouting in the mill, they could not be shifted to accommodate the structural design. Instead, this design had to be fitted to the equipment layout. These unusual features are shown by the plans and section, Figs. 3 and 6. The large concentrations of weight thus placed in unsymmetrical positions with respect to the supports presented a special problem to the designers.

This problem also involved other special considerations. Immediately under each group of bins there could be few if any beams. The bin walls, therefore, had to be self-supporting, and the designers suspended the concrete floors from these walls instead of using the more usual method of supporting the bins on the floors. In general, the bins were two stories deep, and as the various groups started from different floor levels, connections with the main framework of the building were involved throughout a height of four stories, or 61 ft. In the area of the bin portions of the building or adjacent thereto are a stair well, two elevator shafts and a fire cutoff wall. Columns of special and unsymmetrical sections were required in some cases, as shown in Figs. 4 and 6.

Fig. 1—Large feed mill at Denver, Colo.
Elevator headhouse and grain tanks in front, with trainshed covering tracks. Mill building in rear.

Sliding Forms—Under these circumstances it was decided that all of the columns, beams and walls within the area affected by this special design should be constructed of reinforced concrete poured in a continuous vertical run by the use of sliding forms. Pockets were left in the columns to receive beams from the adjacent mill floor

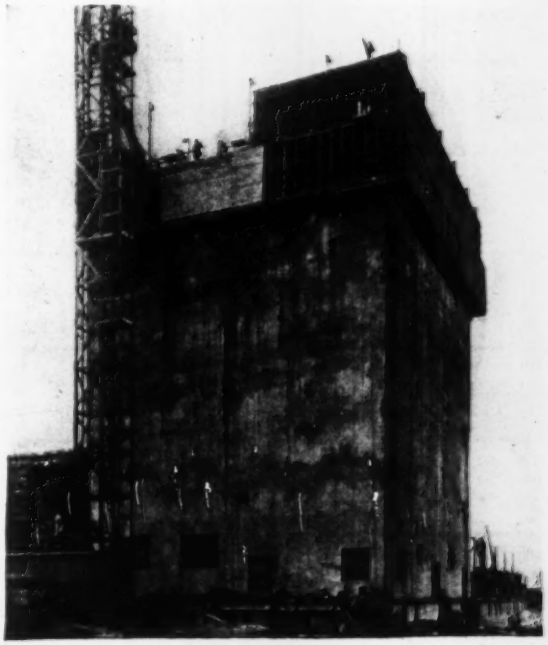


Fig. 2—Construction of elevator headhouse
Slip form for walls. Note inclosed scaffold for finishers; this housing contains salamanders.

panels, while pockets and recesses were provided in the walls within this area to support the floor slabs. Bin-bottom slabs and certain floor slabs were suspended from the bin walls by a system of "hairpin" stirrups made of reinforcing bars and extending up into the walls. Deflections of the structure were reduced to a minimum by the use of extremely deep and thin beams or diaphragms poured monolithic with the walls and columns.

Use of the sliding forms for the walls made it advisable to design all beams which were in the vertical plane of the walls with a stem width equal to the thickness of the walls. Such beams were reinforced with stirrups throughout their length, the ends of the stirrups projecting above the tops of the beams so that they could be crossed and bent down into the floorslabs, which were poured after the sliding forms had passed. These stirrup ends were thus available for negative reinforcement in the slabs. Pouring of concrete in the sliding forms started March 26, 1929, and reached the top on April 3, thus requiring nine days to carry the work 61 ft. in height.

As the floors have to provide a large number of openings for conveyors, machinery, bin outlets and delivery chutes, as shown by Fig. 6, they were designed in general as two-way slabs, supported on beams between columns in both directions, except where the slabs are suspended from the bin walls, as noted above. As a rule these mill floors are designed for a live load of 250 lb., but this loading was increased at certain points to take care of very heavy machines. The structural concrete forms the wearing surface on the floors, and in order

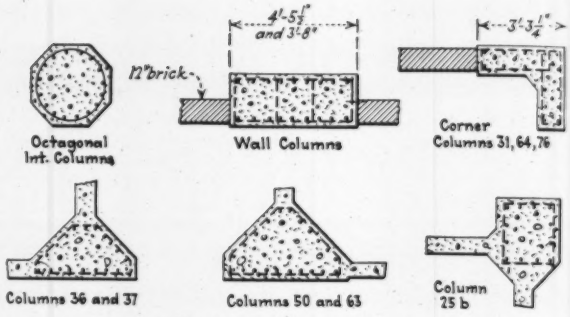


Fig. 4—Column sections

to give a hard and dense floor surface the concrete was finished by floating and troweling the surface of the slab while green. A metallic hardener was also used in the two lower floors.

Trainshed—To cover the tracks on the elevator side of the plant there is a concrete trainshed 180 ft. long, with a span of 28 ft. This is shown in Fig. 1, in front of the headhouse and grain tanks. The inner ends of its roof beams are pocketed into the walls of the elevator headhouse and the tanks, while their outer ends are carried on a thin concrete wall reinforced with pilasters under the beams. This wall, with its pilasters, was constructed with sliding forms. The forms for the roof having been shored in place, it was possible to keep the sliding forms in line with guides fastened to the shoring. Concrete was spouted from the main hoisting tower to a hopper located on the roof deck and was distributed

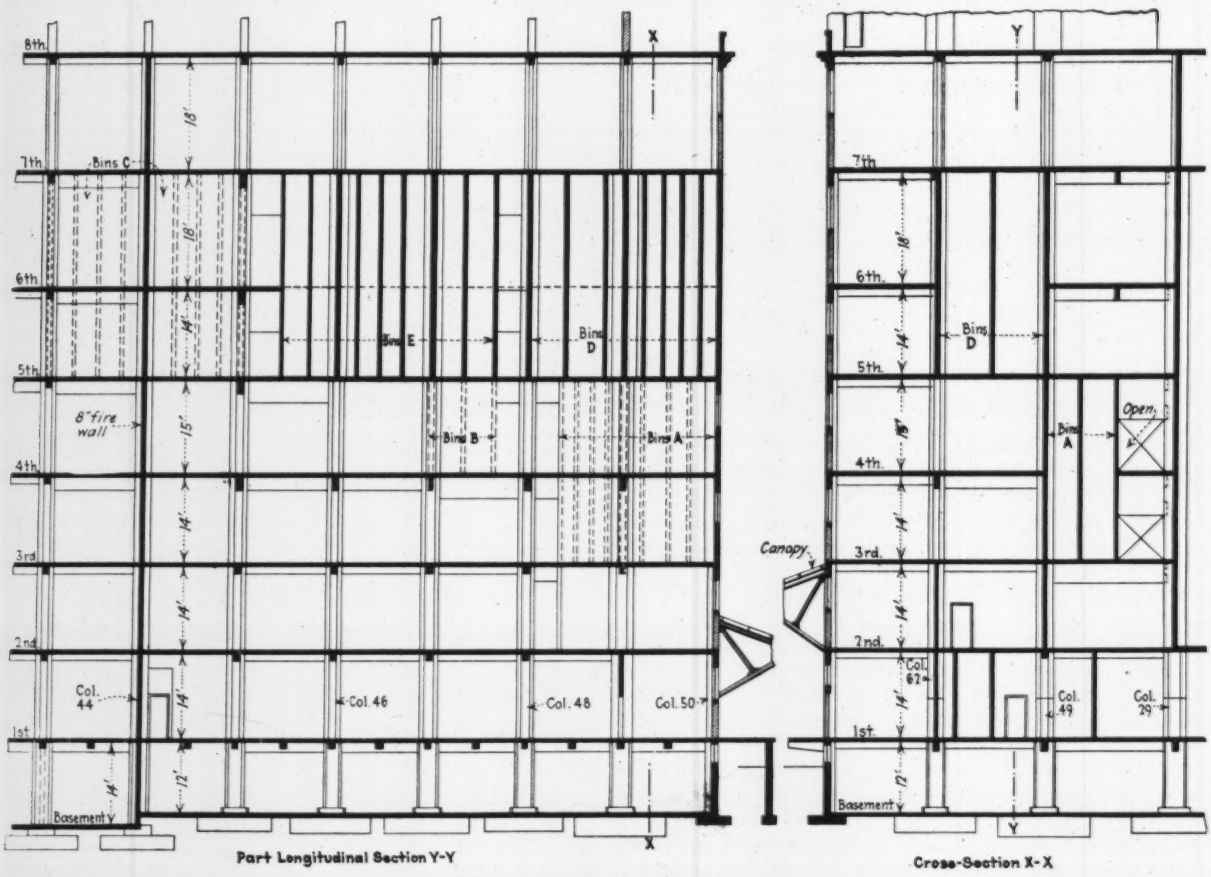


Fig. 3—Sections through mill building, showing bins

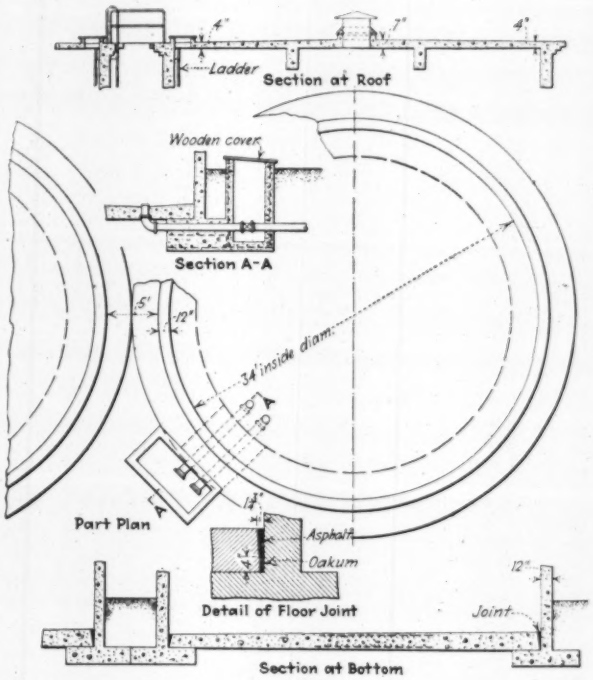


Fig. 5—Concrete tanks for molasses

thence with carts and short chutes. After deposit in the forms, continuous spading puddled it into place, and the exposed surfaces were floated as they came out below the forms. The finished wall was remarkably free from joint marks or irregularities.

Molasses Tanks—Two cylindrical concrete tanks for storage of molasses have each a capacity of about 25 carloads, or 270,000 gal. Their inside diameter is 34 ft. and the height 42 ft. (Fig. 5). The walls are supported on ring footings and are constructed free from the bottom slab. They are 12 in. thick, and the hooping reinforcement was designed to take a stress of 12,500 lb. per sq.in., since it was considered that a stress higher than this could cause cracks to open. Assuming $N = 15$, the equivalent concrete area of 1 ft. of wall at the bottom was 214 sq.in., which corresponded to a total tension over the concrete section of 300 lb. per sq.in. The concrete mix was designed carefully in advance, in order to obtain maximum density and minimum permeability. As the sand used was lacking in fine particles, a small quantity of a commercial admixture was included.

These tank walls were poured with sliding forms, using two sets of mixers and hoists, so that in case one set broke down the other could take care of the work without stopping. The forms were protected against rain, and every precaution was taken to avoid a construction joint with its danger of leakage. The bottom slabs, which rest on compact soil, vary in thickness from a minimum of 12 in. at the outlet to about 20 in. They

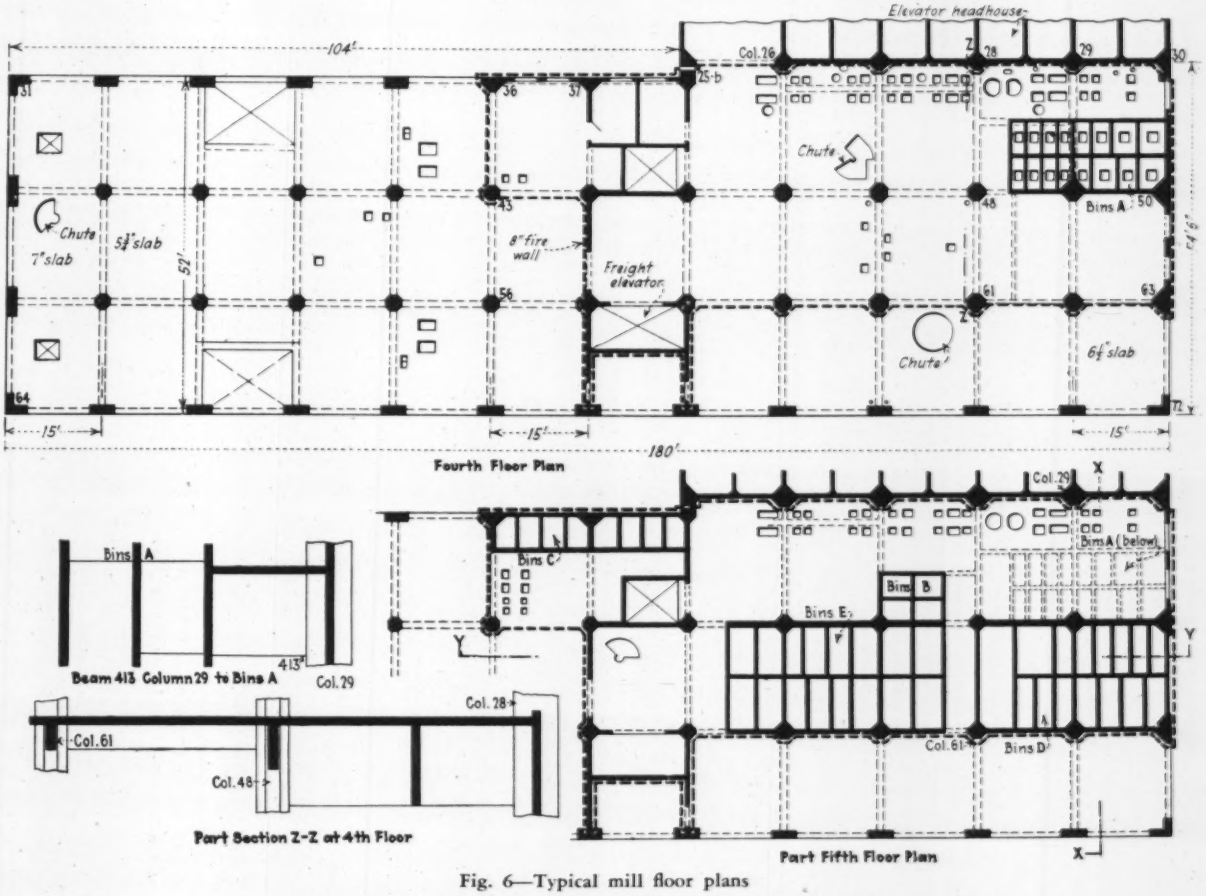


Fig. 6—Typical mill floor plans

Note irregular size and locations of bins. In the area inclosed by heavy dotted lines all columns, walls, beam stems and pilasters were poured in sliding forms above third floor.

Fig. 7—Housing winter concrete work

Headhouse inclosure with slip forms at left, beyond base for elevator tanks. Inclosure of first story of mill building at right.

are reinforced in top and bottom with two layers of ¾-in. bars spaced 6 in. center to center. The joint around the edge was made wedge shaped and the bottom 4 in. calked with oakum, upon which hot asphalt was poured to fill the joint. The inside surfaces of the tanks were painted with a pore-filling waterproofing preparation in order to lessen the penetration of the stored materials. When the tanks were filled with molasses there was no evidence of leakage.

Concreting Plant—For the construction work, two concreting plants were installed at opposite ends of the site, as shown in Fig. 8, one having a ¾-yd. and the other a ½-yd. mixer. These were supplemented by a ⅓-yd. portable mixer. Each hoisting tower was about 140 ft. high, the extra height for the cupola being gained by rehoisting with a boom carried on the sliding forms. Measuring devices regulated the quantities of aggregates and water.

The elevator bucket dumped the concrete at suitable height into a hopper, from which it was chuted to a hopper on the working floor for charging the buggies used in distributing concrete to the forms. In each tower was a stairway for the workmen, with landings or pl- forms at intervals of 6 ft. No skip hoist was used, b- each tower had a boom for hoisting steel, lumber a- other long material. The mixers and hoists were o- erated by electricity. After removal of the forms, t- concrete was finished by floating, rubbing and washi- with grout where necessary to give a neat appearance a- uniform color. The working force averaged 250 me-

Winter concreting—Since this plant was built at a high altitude and since work was started in the dead of winter, it was necessary to take precautions again- freezing of the newly poured concrete. Usual metho- of preheating the concrete materials were followed. In general, the forms were completely housed in with a light framework of wood covered with tarpaulins tightly closed. Inside this housing a large number of coke-burning salamanders kept the temperature above the danger point.

The expense of this housing was large, but this cost was justified, since it enabled the work to proceed in the winter so as to advance the completion of the work by two months.

The finish of the first floor of the mill was required to be monolithic. After the housing was placed, the floor was poured and finished according to the special methods mentioned above. That night there was a 12-in. snow, which would have ruined the finish had it not been for the substantial construction of the housing, which allowed a crew of sweepers to keep it clear of snow.

Designers and Builders—The operating layout and the machinery and spouting were designed by the engineering department of the Ralston Purina Co., St. Louis, Mo., under the direction of E. W. Noxon, manager of the engineering department. The buildings and other structures were designed and constructed by the Jones-Hettelsater Construction Co., Kansas City, Mo. Ground was broken on Christmas day, 1928, and the main buildings were completed by July, 1929.

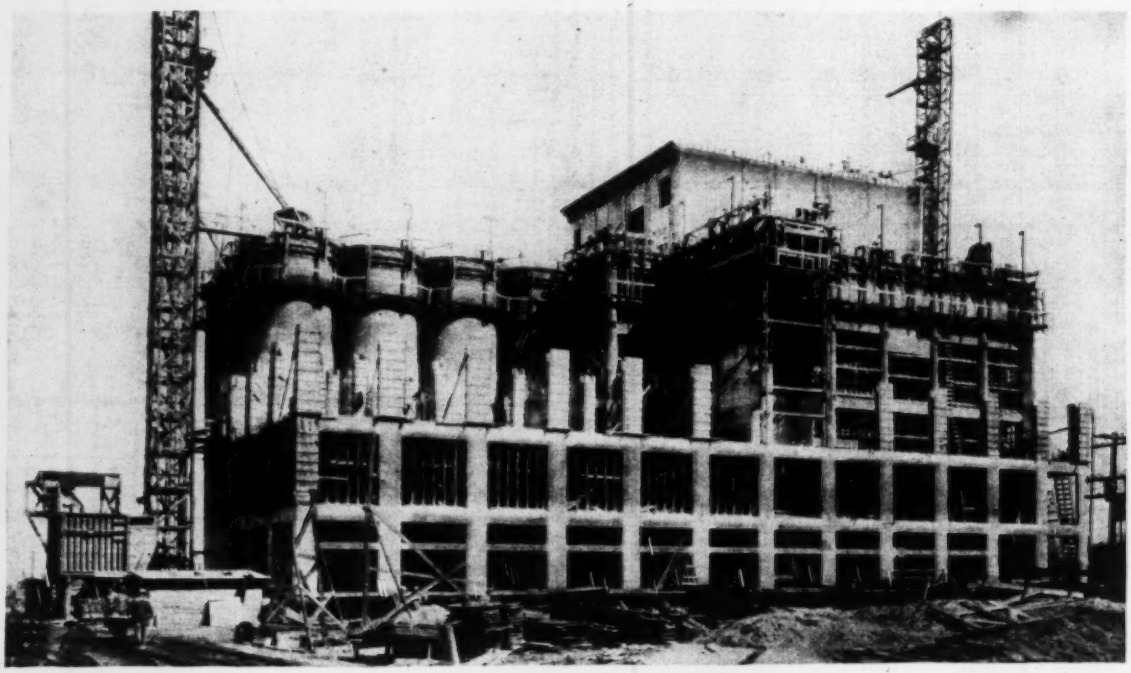


Fig. 8—Construction of feed-mill plant

Mill building in front of grain elevator tanks and headhouse. Note slip forms on tanks and on mill bins at sixth floor level.

Field Notes on

Water-Supply Conditions in the Drought Regions

How the Drought of 1930 is affecting community water supplies is reported in field observations by one of the editors of *Engineering News-Record*, the fourth of which appears below. Despite some local rains the drought continues to cause concern among engineers in water-supply service, especially in some of the South-Central states, where last summer's rain fall was 50 per cent or less of normal. They find themselves entering the year 1931 with depleted reserves or entirely lacking reserves and with little prospect as yet of a return to normal. —Editor.

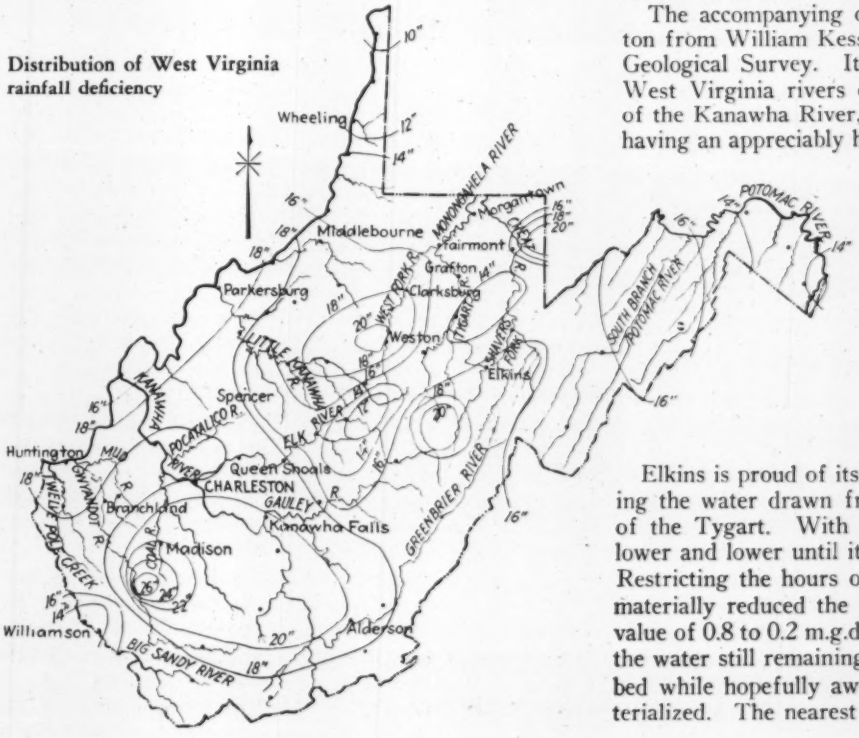
With streamflow reduced to unbelievably low quantities—in many cases to zero—water supplies in West Virginia all but gave up the ghost during the latter part of 1930. Although the period of deficient rainfall, beginning in this state with December, 1929, has not yet been brought to a close, some measure of relief was afforded the stricken water supplies by the light snows and rains of December, 1930. Until that relief occurred numerous water plants were maintaining service by such emergency measures as utilizing the drainage from abandoned coal mines, pumping from distant watersheds through emergency pipe lines and transporting water in tank cars from more fortunate communities. The effects of the drought were serious even in those cities blessed with an adequate supply, as they were forced to combat increased mineralization and highly objectionable tastes in the water caused by low streamflows. Groundwater supplies held up well during the progress of the dry period but are now giving evidences of approaching depletion.

An impounding reservoir is of infrequent occurrence among West Virginia water supplies. The more usual case is a submerged intake pipe drawing water directly from a flowing stream. It is true that low dams built in the river channels are not uncommon, but the amount of water impounded is inconsiderable in these cases as the water level is not raised beyond the normal banks of the stream. Cities along the navigable rivers like the Ohio and Kanawha call for special consideration, as the dams and locks constructed as part of the canalization program produce what are in effect impounded lakes during times of low river flow. Flowing springs abound where water-bearing rock strata outcrop, and a small dam is frequently employed to collect a spring's discharge. But the prevalence of plants drawing directly on flowing streams makes for an immediate response to the unprecedented rainfall and runoff conditions.

Starting with December, 1929, during which precipitation was only 74 per cent of normal, every month up to the present time has shown a rainfall deficiency. The amount received by the state for the calendar year 1930 was but 59 per cent of its normal value. During December, 1930, light snows and rains brought the month's precipitation up to 80 per cent of the average December figure, the nearest approach to normal yet attained. Precipitation in January, 1931, however, was down again to only 35 per cent, and February also shows a marked deficiency.

The effect of this condition of rainfall deficiency upon streamflow was disastrous as the months wore on. Discharge figures became smaller and smaller, and by early summer many streams were showing the lowest discharges on record. In July the flow in some had decreased to zero, and in others was so low that measurement was extremely difficult. The Tygart River, for example, at a point having a contributing drainage area of 1,340 square miles consisted of but a slight trickle of water between the rocks of the streambed for more than four months. For all practicable purposes the river had dried up. And it is from that river that the city of Elkins takes its water supply!

The accompanying diagram was obtained at Charleston from William Kessler, district engineer of the U. S. Geological Survey. It shows clearly what happened to West Virginia rivers during the drought. In the case of the Kanawha River, which appears on the diagram as having an appreciably higher flow than the other streams, the main tributary is the New River, which drains the mountain country of western Virginia and North Carolina, a region of materially different runoff characteristics from those of West Virginia and not so severely affected by rainfall deficiency. The New River maintained a comparatively high discharge all year.



Distribution of West Virginia rainfall deficiency

Elkins is proud of its modern filtration plant for treating the water drawn from the Cheat River, a tributary of the Tygart. With dismay it watched the river get lower and lower until it disappeared entirely on July 29. Restricting the hours of pumpage to three per day had materially reduced the consumption from its customary value of 0.8 to 0.2 m.g.d., and the city proceeded to pump the water still remaining in a shallow pool in the streambed while hopefully awaiting some rainfall. None materialized. The nearest point from which an emergency

supply could be obtained was 2½ miles away, on Shavers Fork which draws on a larger drainage area and a more adequate underground reserve. To reach it a mountain would have to be crossed. A further difficulty arose from the complete lack of power facilities at the proposed intake location.

A pumping plant consisting of a steam boiler and steam-driven pumping equipment was erected at the new location, and arrangements were made to transport coal to the site by motor truck. A pipe line 3,700 ft. long was laid up the steep mountain side to the portal of a tunnel of the Western Maryland Railroad, through the tunnel and thence to an outlet into a tributary of the Cheat River. By this circuitous route the water had to travel more than 10 miles to reach the Elkins water intake. The pumps were started and water was discharged into the tributary of the Cheat, and Elkins waited. An entire week was necessary for the water to arrive at the water-works, so dry was the streambed. The emergency plant was kept in operation throughout

Cherry River at Richwood, W. Va. in July, 1930
Building at right is pulp mill, which was forced to discontinue operations until December.

the fall months and was only discontinued when the rains of December allowed the Cheat River to flow again.

Farther down the Tygart is the city of Grafton with a population of 10,000. During the summer and fall the only flow in the river was a small amount of mine drainage, but water shortage was averted by the fact that the water-works intake extended to a large natural pool in the streambed. However, the hardness, acidity, and iron and manganese content of the water were enormously increased, necessitating an unusually large amount of lime to be used at the filtration plant.

Richwood presented the tragic picture of an entire town put out of business by the drought. The town's population of 6,000 is supported by three industries, a pulp mill, a lumber company and a tannery. By the first of July the flow in Cherry River, from which the pulp mill was accustomed to draw 10 m.g.d., had been reduced to zero. The entire industrial life of the community came to an end. A few weeks earlier the flow from the wells supplying water to domestic consumers had decreased to the point where it was necessary to restrict pumping to two hours a day, but this condition was remedied by replacing the air-lift equipment by deep-well pumps, and an adequate domestic supply was obtained. But the only flow in the river was the sewage and domestic wastes discharged by the city. In December the anxiously awaited rainfall appeared and produced sufficient flow in the river to enable the plants to resume operation.

Spencer is one of the few towns in West Virginia possessing an impounded reservoir. When full it holds 16 m.g. On Sept. 10 it was bone dry. Wells were drilled as an emergency measure but failed to produce. Finally tank cars were pressed into service to bring water from Parkersburg, more than 60 miles away. To supply the requirements of Spencer's population of 3,500, six cars a day were received up to Dec. 28, when sufficient rains had occurred to re-establish flow in the contributing streams. At present the reservoir contains 3 m.g., but the city is allowing it to fill and is drawing water from an old abandoned reservoir at a lower ele-

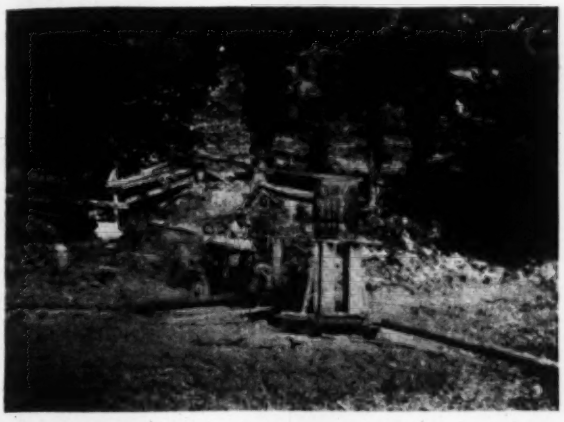
Elk River above Charleston intake in September, 1930
Low flow conditions continued until December.

vation. This storage is too low to allow the operation of the town's filtration plant, so that chlorination is the only treatment provided at present.

Foresight and preparedness prevented serious shortage at Clarksburg. The city's population is 30,000, and it ordinarily uses 3 m.g.d. The water-works on West Fork River is well provided with storage facilities, with three dams in series above the city. As the dry spell progressed the upper reservoirs were depleted to the point of exhaustion. When the total remaining reserve was that held behind the lowest dam a program of trenching the riverbed for 25 miles above the water-works was begun. With the aid of dynamite a ditch 6 or 8 in. deep was excavated in the rocky bed of the stream, and the water held in pools in the river's upper reaches was enabled to reach the water-works. At the same time a strenuous publicity campaign was instituted to induce conservation of the supply. The city responded by reducing its consumption from 3 to 1.5 m.g.d. By this means the last remaining reservoir was drawn upon for a whole month in the late fall without causing its level to drop appreciably. Clarksburg was relieved of its difficulties by the snows and rains occurring near the close of the year.

After the reservoir at Madison became exhausted in November the flow of Pond Fork became so low that it was only possible to operate the pumps intermittently, on 10 min. and off 20 min. Kingston was forced to lay an emergency pipe line to utilize abandoned mine drainage. Bluefield faces a depleted supply in the near future if rains do not occur, for it has but 125 m.g. left of its total storage of 287 m.g.

Although Charleston did not suffer a shortage, its experiences serve well to illustrate a different phase of the problem presented by the drought. The city is built at the confluence of the Elk and Kanawha rivers. Of these two the Kanawha is much the larger and is made navigable by locks and dams. The water-supply intake



Emergency pumping equipment employed by Weston, W. Va.

Portable pumping plant moved water from one pool in river to next until water was made available to intake. Nine miles of river was continually traversed to make slight flow in West Fork River available for water supply.

is on the Elk, 1¼ miles above the junction point. Into the Kanawha and into the Elk below the intake the sewers of Charleston empty. In addition, the municipal incinerator has been discharging 200 tons of household garbage and spoiled produce from wholesale houses for more than a year. The Federal Water Service Corp. operates a filtration plant and supplies the city water.

As the river flow decreased during the drought, the effect of the canal works was to make a long pool of the Kanawha and Elk riverbeds to beyond the city. On July 24 the flow in the Elk had become less than the draft of the Charleston water-works, and the water from the Kanawha pool began to be drawn upstream into the intake, carrying with it its load of organic life. The dissolved oxygen of the raw water fell to zero, the 37 deg. C. bacteria count rose to between 50,000 and 100,000 per cubic centimeter, and B. Coli were evident in 0.001 c.c. A heavy growth of algae and protozoa had developed in the pool, and a nauseating taste developed.

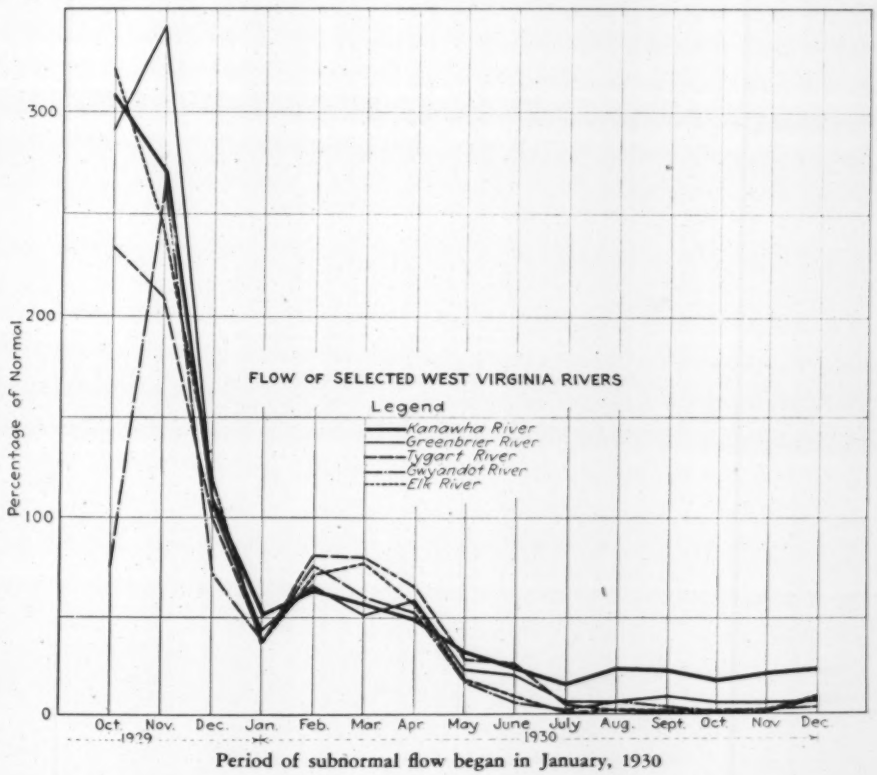
Heroic efforts at purification succeeded in rendering the water bacterially safe but were unsuccessful in removing the vile taste. Prechlorination at the rate of 4 p.p.m. reduced the bacterial load, copper sulphate applied every other day to the river pool reduced the micro-organic life, and aeration at the inlet of the sedimentation basin restored the dissolved oxygen to some extent. But despite superchlorination, ammoniation and the application of powdered activated carbon, it was impossible to remove entirely the objectionable taste. Of them all the aeration seemed to make the most improvement. Filtration through a bed of activated carbon was tried experimentally and seemed to be successful, but was not considered practicable to apply to the entire supply as an emergency measure. The taste persisted until Dec. 20 when flow was re-established in the Elk River.

At Fairmont what water continued to flow down the Tygart River consisted of mine drainage. Hardness increased from its usual value of 20 to 600 p.p.m., and the water became highly acid. In order to treat such water so much lime was used that it became necessary to clean out the sedimentation basin every week. Huntington, drawing on the Ohio River, also confronted a taste and odor problem that developed in December.

Although groundwater supplies in West Virginia gave little trouble during the period of low streamflow, there are indications that the water table has been gradually receding and has now dropped to a point where it is beginning to cause concern.

Wells driven into the bed of the Ohio River furnish water to Moundsville. A few months ago when the flow in the river became low the discharge from the wells began to be somewhat inadequate to meet the demand, and it was found impossible to refill the 1.9-m.g. elevated tank after it had been exhausted in quenching a dump fire. A new well supply is now being developed. New wells are also being drilled at Fairview.

During 1930 there were 166,414 complete typhoid immunizations accomplished under the sponsorship of public health agencies. There is little doubt that this program, in addition to the careful supervision of emergency water supplies, held down to a minimum any increase in water-born diseases incident to the drought experiences. As it was, the typhoid death rate showed a small increase from 11.6 per 100,000 in 1929 to 12.6 in 1930. Such an increase appears inconsiderable, however, in view of the fact that the normal variation in typhoid rate from year to year is as great as the increase noted. —*F. W. H.*



Period of subnormal flow began in January, 1930

Premixed Tar Macadam

A study of the technology of its manufacture, handling and placing properties, and place among oil-mixed surfacing materials for roads

By GEORGE E. MARTIN
Consulting Engineer, General Tarvia Dept., The Barrett Co., New York, N. Y.

THERE IS a definite place in highway improvement for an oil-aggregate-mix paving material that can be manufactured in a central plant under control, be shipped cold and be handled on the job without reheating. Essentially, the material must require only simple equipment, give good results with unskilled labor and provide a tough durable flexible non-skid surface.

A material of the qualities indicated has a place in new construction, particularly on small operations where there cannot be a large outlay for equipment. There is also a large field for a resurfacing material which can be used to modernize old rough pavements. Patching and repair work offers another general use, and there are special uses such as traffic areas, private-estate driveways, parking spaces, and cemetery and park drives.

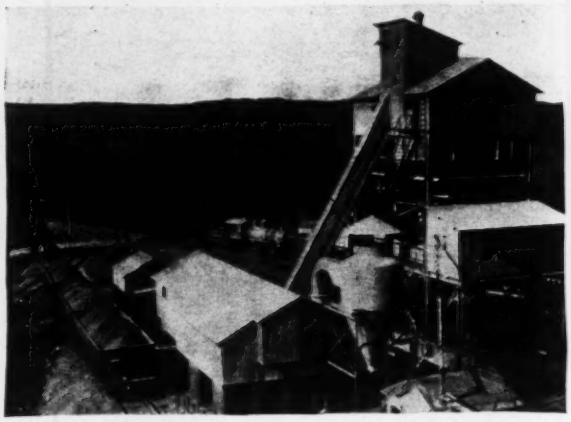
Place Among Oil-Mix Surfacing Processes

Premixed tar macadam is very similar to penetration macadam but has certain advantages over that type. Being under closer control, it is possible to use less tar and still obtain a material that is stable on the road. The surface is finished with a tight top, and there are no loose materials or dust on the surface. Variation in the quality and grading of the aggregate is eliminated by close control at the mixing plant.

Retread or mixed-in-place surfaces do not compete with premixed tar macadam. Premixed tar macadam is a high-class pavement, while the other is just a step above ordinary maintenance operations. One mixture is made in a central plant where every factor is carefully controlled, while the other is manufactured in place on the road surface, using grader blades for mixing.

British Practice Remodeled

Tar macadam has been used in England for twenty years or more under heavy traffic. Knowing the history of this work, a careful investigation of English practice and the results obtained was made in the spring of 1926. The survey established the fact that the basic idea of English tar macadam is sound—namely, that an open mix depends for its stability upon the interlocking of the stone fragments, in contrast to a filled mix that depends upon the strength of the bituminous binder for its stability. However, due to differences in climate, traffic, working conditions, etc., it was considered inadvisable to duplicate the English tar macadam exactly for the United States.



Typical plant for producing premixed tar macadam

England has a damp climate with comparatively little change in temperature. Some modifications would be necessary to take care of the widely varying temperature conditions in the United States. The English engineer expects to use considerable labor and does not demand the construction speed required in the United States. Modifications to permit machine unloading and machine handling would be needed. Immediate surface treatment of the completed pavement was standard English practice but was considered objectionable here.

Initial Experiments

An experimental plant was assembled in 1926 when trial batches were made up. In this experimental plant the stone was dried in a sand drier. As a result of the high heat necessary to dry the stone, part of the limestone was calcined and thus weakened. Later plants were designed to subject the stone to a fairly low heat for a comparatively long time. A grade of tar approximating that used in England was used, and variations in the consistency were also tried.

The experimental material was loaded into gondola cars and shipped about 200 miles. There it was unloaded by hand and used to resurface an old macadam street having very heavy traffic. This street was under observation during 1926 and 1927. While the material had been somewhat difficult to unload and some trouble was

WEIGHT OF FINISHED PAVEMENT PER SQUARE YARD FOR VARIOUS THICKNESSES

Aggregate	Finished Thickness In.	Weight, Lb. Per Sq.Yd.	Sq.Yd. Per Ton	Size of Mix	Loose Depth In.	Weight, Lb. Per Sq.Yd.	Sq.Yd. Per Ton	Size of Mix	Loose Depth In.	Weight, Lb. Per Sq.Yd.	Sq.Yd. Per Ton	Total Loose Depth, In.
Trap or Granite	1	114	17.5	.....	..	..	....	Fine	1¼	114	17.5	1¼
	2	230	8.7	Intermed.	2½	154	13.0	Fine	1	76	26.3	3½
	2½	247	8.1	Intermed.	2½	171	11.7	Fine	1	76	26.3	3½
	2¾	266	7.5	Coarse	2¾	190	10.5	Fine	1	76	26.3	3¾
	2¾	301	6.6	Coarse	3¼	225	8.9	Fine	1	76	26.3	4¼
	3	318	6.3	Coarse	3¼	242	8.3	Fine	1	76	26.3	4¼
Limestone	1	108	18.5	.....	..	..	....	Fine	1¼	108	18.5	1¼
	2	223	9.0	Intermed.	2½	151	13.2	Fine	1	72	27.7	3½
	2½	240	8.3	Intermed.	2½	168	11.9	Fine	1	72	27.7	3½
	2¾	258	7.8	Coarse	2¾	186	10.8	Fine	1	72	27.7	3¾
	2¾	292	6.9	Coarse	3¼	220	9.1	Fine	1	72	27.7	4¼
	3	309	6.5	Coarse	3¼	237	8.4	Fine	1	72	27.7	4¼

experienced in rolling, the final results were such that it was decided to build a commercial plant in 1927.

Essentials of Good Mixtures

As a result of the preliminary experimental work and later experienced with commercial plants, certain requirements have been set up as essential to the production of a satisfactory tar mix. They are as follows:

Coarse Aggregate—The coarse aggregate must be clean and uniform in quality and size. This seems obvious, but it is not always easy to get closely screened aggregate of uniform quality throughout the working season. In the later mixing plants, vibrating screens have been included so that quarry variations in stone sizes can be corrected. For fine aggregate the requirements are the same as for coarse aggregate.

Aggregate Sizes—Sizes of material produced at the various plants have been influenced by the sizes produced by the quarry and by the specifications under which the material must be sold. In general the material is produced in three sizes, the coarse mix ranging in size from 1¼ to 2½ in.; the intermediate mix from ½ to 1¼ in.; and the fine mix from ⅛ to ½ in.

Cleaning and Drying Aggregate—When it enters the mixer the aggregate must be clean and dry and at the proper temperature, which is about 100 deg. F. The aggregate is dried by passing it through a cylindrical drier at a predetermined rate of speed, where it is subjected to the action of hot gases forced through the aggregate by a fan. The dust is thus removed at the same time. Accurate control of the aggregate temperature is very necessary since too hot stone will distill the thin tar coating and produce an unsatisfactory binder.

Tar—A tar binder has been developed which produces a mixture that can be unloaded easily from the cars and handled on the road, and yet when subjected to rolling will bond together into a solid mass. This has been accomplished by selecting particular crude tars for the base and refining them to the proper consistency for the season when the mix is to be used. The tar must also be at the proper temperature for mixing, which will be from 160 to 200 deg. F., depending upon the temperature of the stone.

Proportions—The proper proportions of tar and aggregate for the coarse and intermediate mix will depend upon the grading of the aggregate. As much tar as the stone will hold should be used, but too much will result in tar running from the stone to the bottom of the cars. The amount of tar will vary from three to five per cent on the larger sizes, but the exact amount must be worked out by trial for each individual stone supply. In order to insure the exact amount of tar specified, the tar scales in the plants have been equipped with an electrical cutoff which prevents an over-supply of tar in any batch. The aggregate is weighed by the mixer operator.

The proper proportions for the fine mix has been the subject of considerable study and experiment. Trial sections, using various proportions of tar, fine aggregate, stone dust and sand, were laid near the first plant and closely observed. From this experience it was determined that both sand and dust filler should be used in the fine mix. The exact proportions vary with the different stone supplies. The amount of tar also varies but is usually from 7 to 9 per cent. A typical grading is as follows:

	Per Cent		Per Cent
Fine aggregate	77	Fine mineral filler	10
Sand	5	Tar	8

Shipping and Handling Possibilities

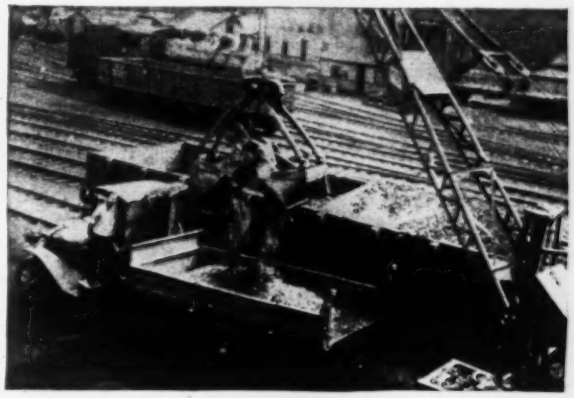
Careful attention to these essentials produces a mix that can be shipped in open cars and be readily unloaded by mechanical unloading equipment or by manual labor. It is easily handled cold on the job and can be stored in stock piles and used as needed. The material sets up on the outside, but there is very little change in the interior.

Four men with forks can unload a 40-ton car in a day. The unloading cost by this method will run about 50c. per ton. The unloading can be done more quickly and economically with a clamshall bucket. This apparatus will ordinarily unload material from the car as rapidly as it can be placed on the road. Experience has shown that the mix can be handled through bottom-dump battleship cars. The car is placed on an elevated trestle, and the tar macadam is dumped directly into the truck. This is the easiest and cheapest method of unloading.

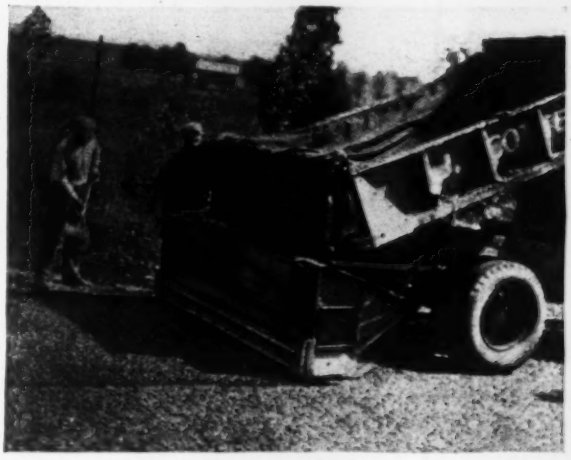
As built, the pavement consists of a bottom or binder course of the coarse or intermediate mix and a top or wearing course of the fine mix. It is essentially an open-mix construction and depends for its stability on the interlocking or keying of the stone fragments by rolling. The bottom course is from 1½ to 3 in. thick after rolling.

All mixtures can be spread by an open-box stone spreader. Excellent work has also been done in spreading the material by hand, with forks or from dumping boards. In some cases it has been taken from the trucks with forks and placed on the road surface.

Three-wheeled macadam rollers are generally used to consolidate each course. They should produce a compression of at least 300 lb. per inch of width of wheel, which means that about a 10-ton roller is needed.



Unloading premixed tar macadam by crane and clamshell



Spreading premixed tar macadam directly from truck

Twelve-ton tandem rollers have also been used. Since the roller operates directly on the tarred stone, it is necessary to wet the wheels to prevent picking up. Water, or a mixture of water and not more than 10 per cent of lubricating oil, may be used. This same mixture may be used on the inside of trucks and on the handling tools to prevent sticking.

After considerable experimental work a fine mix has been developed which does not require a liquid seal. This is accomplished by introducing the proper amount of filler and by the use of specially prepared high-carbon tar.

The construction operations involved in building a pavement of this sort are extremely few and simple. After the foundation is prepared spread the coarse mix and roll; spread the fine mix, roll, and open to traffic.

Penetration Tests Give Bearing Power of Deep Subsurface Soils

Steel points pushed down from surface predetermine load capacity and probable settlement of soil under section of New York subway having a building load surcharge

By GEORGE PAASWELL
Chief Engineer, Corson Construction Corp., New York City

PORTIONS of the four-track rapid-transit subway structure on Houston and Essex Sts. in New York City will ultimately serve as foundations for eight- to 15-story buildings. In this capacity the structure will be required to support building loads of 2¼ to 3 tons a square foot. The subway structure had adequate strength. Question, however, arose whether the bearing power of the soil under the subway would suffice, or whether foundation piles would be necessary. Piles were provided for in the plans, if conditions disclosed the need of them, and were entered as an item in the bidding sheet.

In planning construction it was important to know beforehand the probable need for piles; to wait for soil tests after the excavation had been opened to subgrade meant delay to construction, and moreover it was desirable to devise the sheeting and bracing of the excavation to fit the foundation processes required. Large test pits to subgrade would be costly and were impracticable in many places because of groundwater. The contractors retained Prof. Charles Terzaghi, assisted by Prof. Glennon Gilboy, to develop a method of soil survey which would be reasonable in cost and fairly definite in its predictions. This method and the results secured are described by George Paaswell, chief engineer, Corson Construction Corp., in a paper before the New York section, American Society of Civil Engineers, and the following facts are taken from this paper. —EDITOR.

THE PRELIMINARY BORINGS indicated that the material under the Houston-Essex St. subway was generally sand, graded from very fine to very coarse, down to rock at a considerable depth below the surface. This fact simplified the soil exploration. Settlement in sand is a functior of density and takes place under a given load practically instantaneously, so that if an apparatus is devised to measure density and is then further calibrated to read anticipated settlement under load, the survey can be made in a satisfactory manner.

One way to measure density is to measure resistance to penetration. If a cone-shaped plunger is pushed through the soil and the load required to push it is measured, a curve may be drawn showing at any depth the resistance to penetration. This was the device chosen. As a means of calibration, a pit was dug beside some of the penetration borings and actual loading tests were made. The curve of settlement so found calibrated the penetration device.

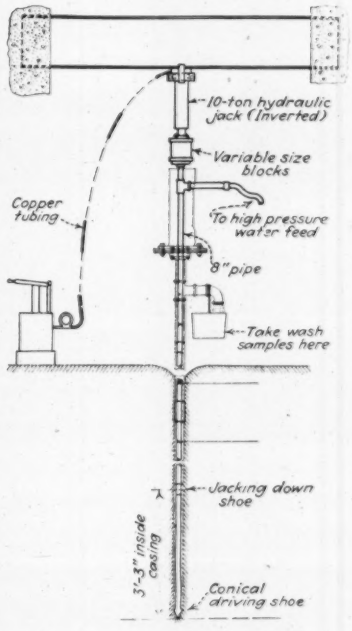


Fig. 1—Assembled device for penetration tests

The penetration apparatus is shown by Fig. 1. It is essentially a conical shoe about 2¾ in. in diameter, attached to double extra heavy 1½-in. pipe. To permit withdrawal of the shoe and also to elimintae the factor of a variable friction through the soil, the shoe was jacked down through a casing 3½ in. in diameter.

The ram of the jack was pushed down 2 in. at a time, the gage reading noted, and the process continued until the full stroke of the jack was reached. The stroke used was 12 in.

Water was then turned on through the shoe and the casing was forced down to the shoe level. A wash of material occurs at this point, and the first readings on the gage indicate a disturbed soil condition. It is safe to take the last reading of the stroke as giving the foundation penetration resistance for the depth traversed by the shoe during the given stroke of the jack. A typical penetration-resistance graph is shown by Fig. 2.

To calibrate the penetration tests, pits were dug alongside several borings. Points for loading tests were selected from the chart (Fig. 2) of the penetration device at sharp breaks in the apparent density of the soil. The material was carefully leveled to avoid any disturbance of the surface to be loaded, and a 1-sq.ft. octagonal plate was placed on this surface. The load was applied

TABLE I—PENETRATION VALUES AND VALUES OF I

Location Test	Value, I, Tons	Settlement at I, in.	Penetration Value, Tons
Fugazy Theatre	4.2	0.22	2.6
Fugazy Theatre	4.4	0.70	4.2
Lafayette St.	4.6	0.50	4.2
Lafayette St.	2.2	0.30	2.2
Lafayette St.	3.4	0.50	3.9
Lafayette St.	2.4	0.40	2.2
Lafayette St.	3.3	0.50	3.1
Lafayette St.	5.0	0.50	3.6
Green St.	4.0	0.60	2.2
Green St.	3.2	0.40	2.3

TABLE II—SETTLEMENT WITH DESIGN LOADING

Test Boring No.	Location	Penetration Value, Tons	Settlement Per Ton of Loading, In.	Settlement Due to Wgt. of Subway, In.	Settlement Due to Backfill, In.	Settlement Under Future Bldg. Loads, In.	Max. Settlement Under Full Load, In.
1	MacDougal St.	4.0	0.13	0.07	0.16	0.30	0.37
2	Thompson St.	3.5	0.14	0.07	0.08	0.30	0.37
3	Greene St.	2.2	0.23	0.12	0.16	0.52	0.64
3a	Mercer St.	4.0	0.13	0.07	0.05	0.35	0.42
4	Lafayette St.	3.5	0.14	0.07	0.07	0.36	0.43
5	Elizabeth St.	5.1	0.10	0.05	0.15	0.22	0.27
6	Second Ave.	4.2	0.12	0.06	0.14	0.36	0.42
7	Forsyth St.	5.0	0.10	0.05	0.06	0.22	0.27
8	First Ave.	5.5	0.09	0.05	0.05	0.22	0.27
9	Ludlow St.	3.5	0.14	0.07	0.19	0.32	0.39
10	Stanton St.	3.0	0.17	0.09	0.13	....	0.22
11	Rivington St.	1.9	0.25	0.13	0.25	....	0.38
12	Delancey St.	2.5	0.20	0.10	0.24	....	0.44
13	Broome St.	3.6	0.14	0.07	0.19	....	0.33

by a hydraulic jack. Readings were taken by means of two Ames dials, so that the average would compensate for any tilting of the device. A typical load-settlement curve of this loading test is shown by Fig. 3.

Settlement Decreased by Surcharge

Discussing sand only, if the surface is fairly large and the load is applied on a small portion, the disturbance may be described as follows (see Fig. 4): Directly under the load a wedge forces itself vertically downward. Within this wedge the movement of the grains is essentially vertical and downward. Adjacent to this wedge, within the areas marked (*2*), the grains have a composite motion approximately parallel to the bounding curves marked *AB*. This may be termed a rotational effect. In the remaining areas, marked (*3*), there is an upward component of motion. Covering the soil surface adjacent to the loaded area materially decreases the settlement. This was brought out in several experiments.

A 1-sq.ft. loading plate was inserted in a 16-in. pipe about 2 ft. long, and the pit was then backfilled to the top of the pipe, giving about 2 ft. of surcharge. The settlement curve marked *B* (Fig. 5) gives the load-settlement relation under a surcharge loading. The increased resistance to settlement under the higher loads is clearly indicated on this curve.

At about the subgrade level of the pit a concrete slab, octagonal in shape, was poured with sloping sides, covering substantially the bottom of the pit. The form was stripped and the sides of the concrete thoroughly greased, then tar paper was placed along the side and the space between this slab and the pit sheeting filled with concrete. This gave a surcharge of about 30 ft. above the bottom of the pit. Curve *C* (Fig. 5) gives the relation between the observed settlements and the loads. The characteristic straight-line curve is noted here, as in the surcharge test described above.

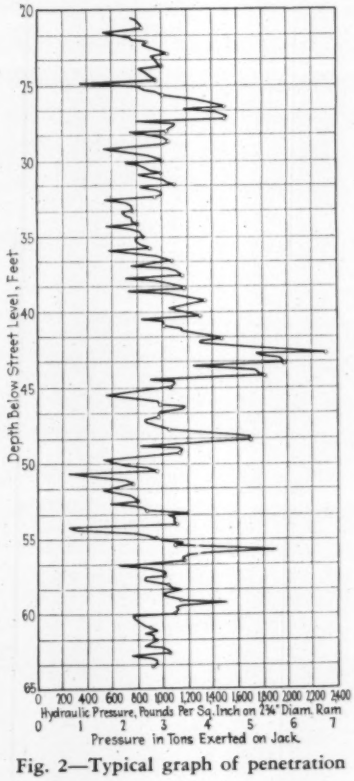


Fig. 2—Typical graph of penetration test

Upon completion of a loading test with a surcharge of about 3 ft., the surcharge was removed in 6-in. layers, a test run being made after the removal of each layer. Fig. 6 gives the series of curves as the surcharge was decreased.

Recognizing that the subway loading at subgrade is essentially a surcharge effect, the 1-sq.ft. loading test must be interpreted with the decreased settlement due to surcharge carefully borne in mind.

The 1-sq.ft. loading test without surcharge surface, however, serves a useful purpose for calibrating the penetration shoe. While from the few data at hand it is yet impossible to give an exact and general relation between the penetration shoe reading and the proper load-settlement curve, sufficiently exact relations may be established to serve as a guide to probable settlement under load. This method appears to be the most exact field method yet available for soil under load. On each 1-sq.ft. loading chart (Fig. 3) is an intersection point marked *I*, fairly characteristic for this curve. Table I gives the values of *I* that coordinates with tons and settlement and penetration. There is a striking coincidence sufficiently frequent, not to be accidental, between the value at the intersection point *I* and the penetration value.

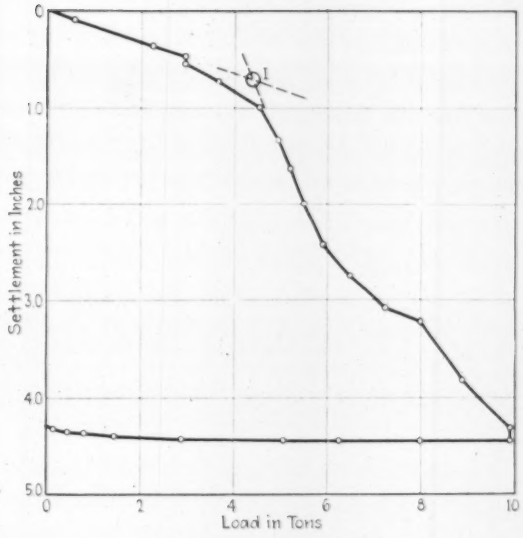


Fig. 3—Typical graph of bearing test

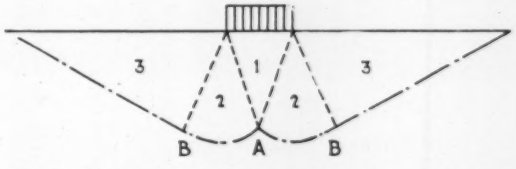


Fig. 4—Diagram of sand action under concentrated load

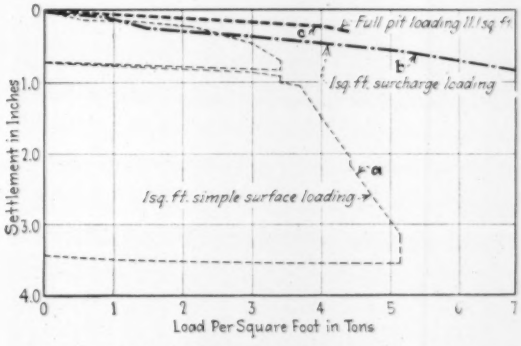

Full pit loading 11 sq ft
1sq ft. surcharge loading
1sq ft. simple surface loading
Settlement in Inches
Load Per Square Foot in Tons

Fig. 5—Typical graph of load test with surcharge

Briefly summarized, it seems safe to state that the value in tons, as expressed by the penetration resistance, is that load per square foot on the soil which will produce approximately a settlement of 1 cm.

For the purpose of our calibration it was fixed that the penetration resistance was that load in tons per square foot that would produce a settlement not to exceed ½ in. The surface-loading tests measured soils

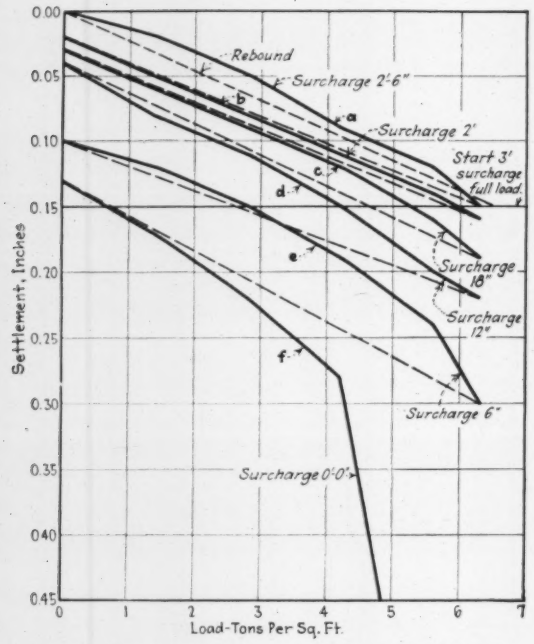


Fig. 6—Graph showing effect of reducing surcharge

of sand running practically the entire range of densities encountered on the job. The surcharge test, which agrees with the actual type of subgrade loading, shows that the settlement varies directly with the load up to at least 6 tons per square foot, which was the limiting range of the experiment. Taking the constant settlement of ½ in. and dividing by the penetration value at subgrade gives the settlement in inches per ton of loading.

Practicable Application

The subgrade of the subway will be loaded in the following sequence: (1) the weight of the subway structure itself; (2) the increased loading due to the backfill upon the roof; and (3) the additional loading when this backfill is excavated and the building load applied.

Table II is a complete analysis of the penetration values and anticipated behavior of the soil under load.

Weight of Soot Deposit in England

The enormous amount of atmospheric soot, dust and dirt deposited in industrial districts in England is indicated by records of gages at 28 cities, for the year ended March, 1930, as listed in *The Engineer*, of London. Reduced to tons per square mile per year, the figures range from 120 tons at Gloucester to 531 tons at Burnley, while London is at a medium position with 254 tons. In permitting the erection of new power stations in London, the electricity commission has imposed conditions requiring the use of cleaning and washing apparatus adequate for removing the greater part of solid and gaseous impurities from the waste gases before these gases are discharged into the atmosphere. It is suggested also that London and other large cities should prohibit the use of raw bituminous coal for domestic purposes, or prohibit the use of any smoke-producing solid fuel, since market supplies of anthracite and coke are now sufficient to meet all demands.

LETTERS TO THE EDITOR

Cellular Corewalls for Dams

Sir—Referring to the article on cellular corewalls in your issue of Feb. 26, 1931, p. 359, the National Irrigation Commission of Mexico has requested that Angel García Lascurain be given credit for being the designer of the Requena corewall.

This fact was unknown to me when I wrote the article, and this company would be very glad if you could find space to make the above acknowledgment. C. H. HOWELL,
Chief Engineer,
The J. G. White Engineering Corp., S. en C.

Mexico City,
March 5, 1931.

Government Functions?

Sir—With reference to your editorial under the above heading in the issue of *Engineering News-Record* of Feb. 12, it is, I think, acknowledged that the responsibility for injecting the federal government into matters which you submit are outside its concern rests with an engineer, President Hoover, when he was directing the Department of Commerce. The wisdom of his action may be disputed, but if it wakes up the surveyors and engineers of the North American continent to the necessity of applying all their knowledge to the solution of one of the great problems of urban development, it will have been of incalculable benefit.

When the history of the 19th century is written, say at the end of the present century, it is probable that the historians dealing with the development of the North American continent will marvel that, despite so much done by surveyors and engineers, there was an almost complete failure to realize that towns and cities should be planned to fit their sites, and suitable for the occupations in which the citizens were engaged. This is more remarkable because the first president of the republic, himself a qualified surveyor, realized this fact and had the vision to plan a capital city which is still admitted to be one of the finest in the world.

In spite of this splendid example, the surveyors and engineers of the North American continent have for more than a century refused to give to town and city planning the study and direction they have given to other engineering problems, and have complacently accepted the conclusions arrived at by a commission reporting on a plan for the city of New York in 1811. Thus there has been imposed all over the continent an arbitrary rectangular system for the subdivision of urban lands, requiring streets of uniform width to be laid in the direction of the cardinal points of the compass, with a complete disregard of topography, or of the service the street may be expected to render.

You appear to think that even today subdivision owners need persuading to dedicate enough street area. The real trouble is that usually they dedicate too much, but because all streets are of a standard width it is wasteful and inefficient. It is just as foolish as designing a sewer system with all pipes of one diameter.

It may be advisable to standardize some details in street planning, as in steel-bridge construction, but by this time it should be realized that towns and cities cannot be properly planned when topography is ignored, any more than bridges can be safely built with disregard for the character of the soil. A standard width and direction of street is no more sensible than a standard span for bridges. Engineers have not submitted to the dictation of clients when designing bridges, and they should no longer be willing to submit to the dictation of land owners as to the plans for the development of urban lands, when they know that the plans are false to scientific principles, public economy and social welfare. A most encouraging sign is that such a large proportion of the membership of the American Society of Civil Engineers now realize their responsibility for city planning. Looking on from the outside we are inclined to think that President Hoover is largely responsible for this awakening.

A. G. DALZELL,
President of the Town Planning Institute of Canada.

Toronto, Canada,
Feb. 19, 1931.

NEWS OF THE WEEK

All County Roads in North Carolina Taken Into Its State System

ALL COUNTY roads in North Carolina, amounting to some 45,000 miles, will hereafter be financed and maintained by the state under the terms of an act of the legislature recently passed. Two years ago the gasoline tax in that state was increased from 4c. to 5c., the additional income either being used by the state in maintaining such county roads as it could take over or being turned back on a pro rata basis to the counties to apply against their several road-debt service charges. There was further appropriated at this time $500,000 from the state highway fund annually for the same use by the counties, under state supervision. Most of the counties elected the debt-service plan.

In the future all income from 2c. of the gasoline tax will be used by the state highway commission for county road maintenance. None of the gasoline tax will be turned over to the counties for debt service, nor will the counties be permitted to raise money by taxation for use on their roads.

All road tools and equipment now owned by the counties are taken over by the state without cost to the latter. Hereafter there also will be no county highway officials nor any county highway organizations of any sort, the state handling all of the road maintenance in all counties outside of incorporated towns and cities.

As there have been no town roads in North Carolina, all roads in the state are now handled by the state highway department.

Kansas Adopts License Law for Engineers

Among the bills passed by the Kansas legislature at its recent session was one providing for the registration of professional engineers. Provision is made for a registration and examining board composed of five registered professional engineers, who must be 35 years of age and residents of the state for three years, as well as members in good standing of a recognized state or national engineering society. Not more than two members of the board shall be from the same branch of engineering. The registration fee is $25 and the annual fee $2.

An applicant for registration must be 25 years old, have been actively engaged at least four years in professional engineering work, and submit satisfactory evidence that he is qualified and experienced in professional engineering in one or more of the following branches: civil, mechanical, electrical, architectural, mining, and chemical. The character, training and experience of the applicant shall in no case be less than that required for membership in the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, or similar national engineering society covering the field of engineering in which he wishes to practice.

A copartnership, a corporation or a joint stock association may engage in the practice of professional engineering as registered engineers, provided such practice is carried on under the responsible direction of one or more registered professional engineers, whose name or names shall appear on all plans and other official documents connected with such professional engineering practice.

Bids Opened for New Boston Water-Supply Tunnel

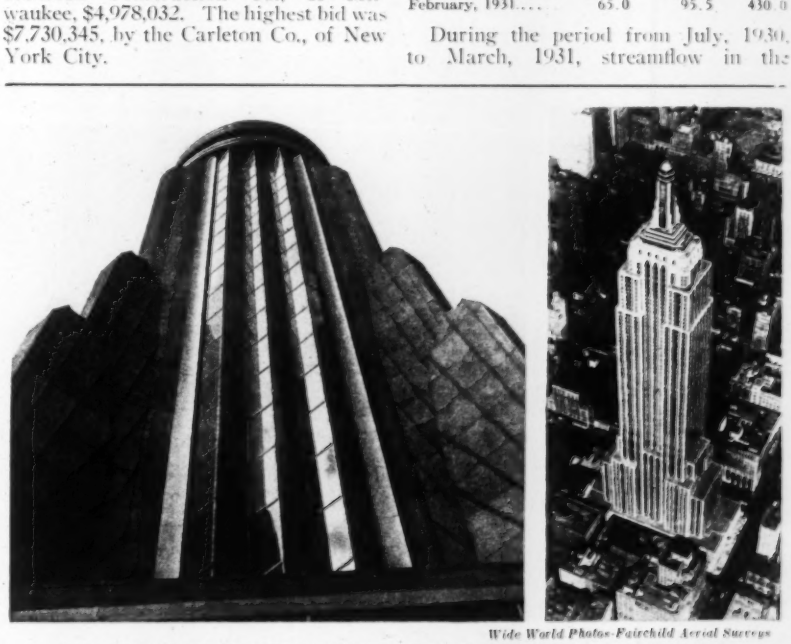
Thirteen bids for the construction of the water tunnel from the Ware River to the Swift River were opened on March 26 by the Metropolitan Water Supply Commission of Boston. The lowest bid was that of the Wenzel & Hencock Construction Co., of Milwaukee, $4,978,032. The highest bid was $7,730,345, by the Carleton Co., of New York City.

N.Y. City Planning an Additional Water Supply Development

DESPITE the fact that the water-supply system of New York City is believed to be capable of meeting present demands, with a 10 per cent margin of safety, during conditions equivalent to the worst drought on record since 1868, the inherent uncertainty of calculations based upon past records has led the city to take unusual steps to increase the supply and decrease consumption during the past few months, according to a paper presented by W. W. Brush, chief engineer of the city department of water supply, gas and electricity, before the New York section of the American Society of Civil Engineers. The seriousness of the present situation is reflected in the following figures showing comparative yields on the three principal watersheds during corresponding periods of 1930 and 1931:

Month	Average Yield, M.G.D. Schoharie	Esopus	Croton
January, 1930	416.1	343.5	400.9
January, 1931	37.5	17.8	209.2
February, 1930	296.6	246.2	376.4
February, 1931	65.0	95.5	430.0

During the period from July, 1930, to March, 1931, streamflow in the



Wide World Photos-Fairchild Aerial Surveys

BEACON TOWER ATOP EMPIRE STATE BUILDING COMPLETED

In addition to its height above the street, 1,248 ft., the 200-ft. tower that surmounts the 85-story Empire State Building in New York City is remarkable for the type of wall that incloses the steel framework. In the accompanying illustrations the corner "wings" are sandblasted aluminum castings. Chrome-nickel steel mullions outline the windows, which are set sawtooth. The cap piece is chrome-nickel steel. The main observation floor is on the roof of the building, but a smaller observation gallery is located beneath the cap piece. The design of the steel framework of this tower was described in *Engineering News-Record* Jan. 22, 1931, p. 153. The use of this tower as a mooring mast for airships is not a prospect for the immediate future, in spite of news accounts to the contrary.

Catskill system (Schoharie and Esopus watersheds) averaged only 60 per cent of normal. Stored water in the Catskill reservoirs at the end of March totaled approximately 27,000 m.g., compared with 120,000 m.g. a year ago.

The city's normal expected consumption of 930 m.g.d. has been reduced to about 860 m.g.d. by the elimination of street flushing and other non-essential uses of water by city departments, by appeals to the public through newspapers, the radio and motion pictures and by intensive efforts to locate and repair leaks in the distribution system. In addition, a 20 per cent increase in water rates and the extension of metering to all private consumers is under consideration. Average consumption in February, 1930, was 903.7 m.g.d.

Immediately available sources of additional supply are limited to wells on Long Island and Staten Island. Proposed development of the Delaware River tributaries to yield 660 m.g.d. has been contested by New Jersey and awaits a decision of the U. S. Supreme Court, which will hear final arguments in the matter on April 13. The city has already appropriated $500,000, and will shortly call for bids, for the installation of a connection between the Croton gatehouse and the Catskill aqueduct near Kitchawan, N. Y., to transfer surplus water from the Croton watershed to the Catskill aqueduct supply line. This will permit utilization of approximately 30,000 m.g. over and above the quantity necessary to maintain a capacity flow of 320 m.g.d. through the old and new Croton aqueducts. This water will be pumped through a 1,800-ft. steel pipe line by three motor-driven centrifugal pumps with a total capacity of 180 m.g.d. against a head of 200 ft.

Wells on Long Island are now yielding a flow of 100 m.g.d., and it is estimated that an additional 60 m.g.d. can be obtained from this source, provided approval can be obtained from the state Water Power and Control Commission. Appropriations totaling $1,500,000 for additional wells were authorized in 1929 and 1930. The first contract called for a yield of from 10 to 12 m.g.d. at three stations in Queens, tapping strata at depths of from 150 to 450 ft. Each well, yielding from 1¼ to 2 m.g.d., is equipped with a submerged multi-stage centrifugal pump direct-connected to an electric motor above ground. Two of these wells are now in operation and two more have been completed and tested but are being held in reserve pending the installation of iron filters. They are available, however, for emergency use.

Resignation of Arizona Highway Engineer Announced

Resignation of W. W. Lane, state highway engineer of Arizona, was announced on March 25 following closely upon the reorganization of the state highway commission which became effective March 16. Three new members of the commission, forming a majority of the body, were recent appointees of Governor Hunt. Shortly before the old commission went out of office it ordered a salary reduction in the organization of the state highway engineer's department amounting to an annual total of approximately $36,000.

Behind the resignation of Mr. Lane are evidences of political reorganization in the highway administration following the election of Governor Hunt last fall. Shortly after the change in state administration a request was made to the bureau of public roads for permission to use day labor work on the federal-aid projects in Arizona. This request was refused. A bill to permit day labor work on state highway projects not under federal supervision was sponsored by the governor in a direct appeal to the legislature on a plea to relieve the unemployment situation. This measure did not pass the Arizona legislature. A bill to provide a one-man highway commission in place of the present five-man organization also was introduced and defeated.

The vacancy of three positions on the highway commission at about that time permitted a change in control and the new appointees of Governor Hunt were recently confirmed by the Senate after considerable delay and discussion.

The present change in highway administration, reduction in salaries and resulting disorganization in the state highway office come at a time when the state has an $8,000,000 highway program under way, including the various federal-aid and emergency funds. The salary reductions will result in saving only about 0.4 of 1 per cent of the amount in this year's highway budget.

Earthquake Kills Over 1,000 in Managua, Nicaragua

A known death list of 1,100, with many times that number of injuries and extensive damage to buildings and disruption of the waterworks system, was the result of a serious earthquake in Managua, Nicaragua, on the morning of March 31. Eleven sharp shocks occurred within a few minutes, and fire started immediately afterward. The city, which has a population of approximately 75,000, consists almost entirely of low adobe buildings, most of which are said to be damaged to a greater or less extent. No casualties were reported among the army engineers engaged in surveys for the proposed Nicaraguan canal, who are using the city as a base of operations.

Bear Mountain Bridge Shows Deficit in 5-Year Operation

Warren T. Thayer, chairman of the New York State Senate committee on public service, has revealed figures he has obtained of receipts from the operation of the Bear Mountain bridge across the Hudson River, which the state has the right to purchase under the terms of its charter at the end of any five-year period.

According to Senator Thayer, the first year's operations showed a surplus above all expenses and interest on bonds, taxes, etc., of $61,712.70; the second year, however, showed a deficit of $105,735.42, which was due to repainting the entire structure and repairs to piers, etc.; the third year showed a deficit of $731.85; the fourth year a surplus of $99,521.14, while the fifth year's operation showed a deficit of $59,353.80; for the five years there has been a deficit of $4,589.23. The highest salary paid is $10,000 a year to the bridge superintendent; the total maintenance and operating expenses are slightly more than $59,000 per year.

Wide World Photo.

ONLY ELEVATED SECTION OF NEW YORK'S INDEPENDENT SUBWAY

At a considerable saving in cost over a subaqueous crossing, the four-track subway along Ninth St., Brooklyn, is brought from underground to cross Gowanus Canal over a high-level fixed bridge. This illustration shows the east approach viaduct crossing Fourth Ave., Brooklyn. To reach a height of 90 ft. over the canal, set by navigation requirements, the approach viaducts will be among the highest structures in all of New York's extensive rapid-transit systems.

Large Activated-Sludge Plant Recommended for Cleveland

Construction of works for the complete treatment of sewage originating in the Easterly district of Cleveland, Ohio, at an estimated cost of $12,000,000 is recommended as a logical and necessary step in the program of cleaning up the polluted frontage water of the city in a report recently submitted to city authorities by George B. Gascoigne, consulting engineer. The plant, which would be located on city-owned property on the shore of Lake Erie at East 140th St., would be of the activated sludge type with capacity to care for a population of 770,000. Because of the restricted area available at the site, supplementary treatment of deposited solids would be transferred to the existing Southerly treatment works of the city, about 13 miles distant.

Facilities to be provided at the new plant would include the following: bar gratings, grit chambers, oil and grease catchers, presettling tanks, aeration tanks, sludge-settling tanks, chlorination equipment, sludge pumps and the necessary buildings. Complete treatment would be given to all flows up to a maximum of 1½ times the dry-weather flow, and partial treatment (sedimentation with a twenty-minute period of detention) to quantities between 1½ and 2½ times dry-weather flow. Dry-weather flow is estimated at approximately 160 gal. per capita for the area served. It is estimated that treatment upon this basis would remove from the lake waters about 5,000 tons of solid polluting material each year.

Twin Cities Engineers Support Unified Sewage-Disposal Plan

Formation of a metropolitan district to take over the treatment of all sewage from Minneapolis, St. Paul and, possibly, South St. Paul and Newport, Minn., is indorsed in a report submitted by a special board of nine prominent engineers representing the Northwestern section, American Society of Civil Engineers, the Engineers' Society of St. Paul and the Engineers' Club of Minneapolis. This board was appointed in January to review the work of the Metropolitan Drainage Commission, a state body which had already reported in favor of the creation of such a district. *(Engineering News-Record*, Feb. 12, p. 292.)

The engineers' report, after touching upon unsanitary conditions now prevailing along the Mississippi River below the Twin Cities, gives unqualified approval to a plan of the commission, known as Project I-5, which contemplates the construction of intercepting sewers along each bank of the river, terminating at an activated-sludge plant to be located on the east shore about 4 miles below the St. Paul Union Station. It also approves an extension of this plan providing for the delivery of sewage from South St. Paul and Newport to the same disposal plant.

The report also indorses a system of cost allocation proposed by the commission, as follows: (1) charges for cost of construction, operation and maintenance on work used exclusively by one municipality to be charged to that municipality; (2) cost of construction, operation and maintenance of intercepting sewers used in common, and of treatment works, to be apportioned according to the measured quantities of sewage from each community.

Personnel of the special board was as follows: for the Northwestern section, American Society of Civil Engineers—Frederick Bass, professor of municipal and sanitary engineering, University of Minnesota; Adolph F. Meyer, consulting engineer; Arthur S. Milinowski, consulting engineer. For the Engineers' Society of St. Paul—Jens A. Holmboe, senior assistant civil engineer, St. Paul department of public works; L. O. Painter, chief engineer, Tri-State Telephone & Telegraph Co.; Emil H. Schulz, chief engineer, Minnesota Transfer Railway. For the Engineers' Club of Minneapolis—Edward P. Burch, Howard E. McWethy, and Francis C. Shenehon, consulting engineers.

Rules of Business Practice Reviewed by Trade Commission

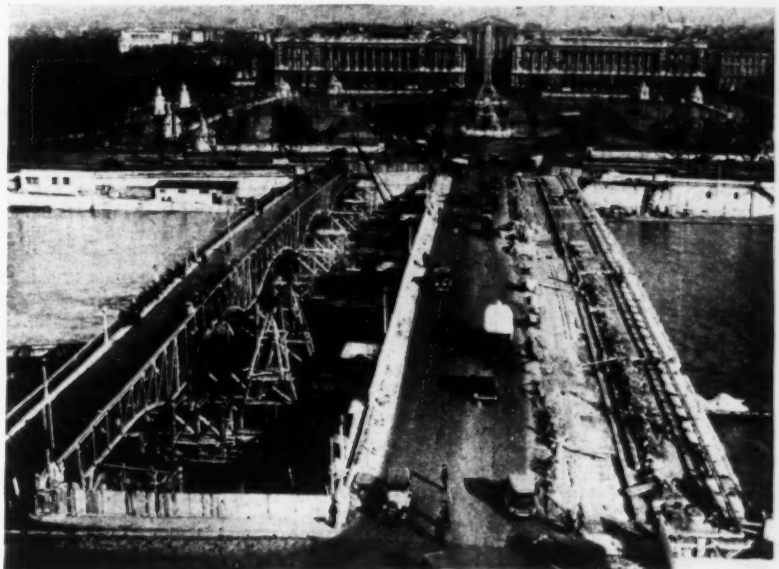
The Federal Trade Commission has announced completion of the task of reviewing the rules of business practice adopted by nearly 80 industries at trade practice conferences held at various times, mostly in the last five years. The rules for each industry will be announced separately after each industry has been given an opportunity to adopt changes made by the commission.

Geared Steam Turbine Tug Is Launched on Great Lakes

What is believed to be the first geared turbine drive tug, at least first on the Great Lakes, was launched March 21 at the yards of the Manitowoc (Wis.) Shipbuilding Corp. It was built for the Great Lakes Dredge & Dock Co. and has a length of 116 ft., a beam of 26 ft. and depth of 15 ft. This geared turbine unit will produce 850 shaft horsepower. The gears are inclosed in a welded steel case. Steam will be generated at 300 lb. pressure in a water-tube boiler equipped with oil burners and superheaters. One of the reasons for the use of steam is the necessity for live steam and heat in so many of the contractors' operations.

Will Sell Remaining Land in California State Settlements

Completing its retirement from the conduct of its two state irrigation and land-settlement projects, California will on April 10 sell all unsold and repossessed farms in the Delhi colony to the highest bidder and later will sell the small amount of unsold land in the Durham colony. At Delhi the state-owned land includes 38 improved farms (some are partly financed at 5½ per cent under Federal Land Bank loans), 43 unimproved farms, some poultry ranches and 106 acres of business and residential property. [The intention of California to withdraw from these state-aid projects was noted Oct. 9, 1930, p. 588. Estimated losses to the state, according to report, have been $2,750,000 at Delhi and $700,000 at Durham.]



Acme Photo

ENLARGING THE CONCORDE BRIDGE IN PARIS

A view of the work of enlarging the Concorde Bridge in Paris. In the background is the Place de la Concorde, with the Madeleine Church at its farthest extremity. The Hotel Crillon is on the left, the Museum Marine on the right. The old section of the bridge is on the right, the new part in the center.

New Bids to Be Asked on Hydraulic Laboratory

Because of slight errors in the two low basic bids for the construction of the new hydraulic laboratory building at the U. S. Bureau of Standards in Washington, it has been decided to ask for new bids, to be opened on April 7. It was found when the bids were opened on March 23 that the firm of Stofflet & Tillotson was the low bidder at $303,900. The second low bidder was George E. Wyne, with a bid of $305,400. In analyzing these two low bids it was discovered that Stofflet & Tillotson did not specify the time for commencement and for completion and that George E. Wyne did not include unit costs.

As the entire appropriation authorized for construction of the building and purchase of equipment is $350,000, officials of the bureau feel that it is necessary to get the building constructed for not much more than $300,000. If this can be done, it will be possible to obtain the necessary equipment within the amount authorized in the appropriation.

Bids for the construction of nine sluice gates will be opened on April 10. Two of these gates will be 72x72 in. Two will be 72x84 in. Others will vary in size from 96-in. diameter to 60x60 in. and 36-in. diameter.

To Discuss Bridge Clearances on the Mississippi

Fixing standard bridge clearances over the Mississippi River between the mouth of the Red River and the head of The Passes below New Orleans will be the subject of a public hearing to be held by a special board of engineers of the Corps of Engineers, U. S. Army, at the City Hall, New Orleans, La., on Wednesday, May 27. According to Lieut. Col. F. B. Wilby, Corps of Engineers, senior member of the special board, with offices at 1006 McCall Building, Memphis, Tenn., all interested persons are invited to be present to express their views on the proper bridge clearances for present and prospective navigation and commerce. Records of the hearing will be forwarded for consideration by the war department. Written statements may be mailed to Lieut. Col. Wilby or presented at the meeting. This hearing is one of a series being held in connection with the development of a comprehensive plan for fixing standard clearances for bridges over the Mississippi and its principal tributaries below Cairo, Ill.

The announcement presents a number of clearances which it states are given as minimums to provide a basis for discussion at the hearing. Between the mouth of the Red River and the western limits of the city of New Orleans, bridges shall be placed only on straight reaches or where currents are straight; horizontal clearance for the principal navigation span shall be 750 ft.; horizontal clearances for other spans over deep water shall be not less than 500 ft.; vertical clearance for principal navigation span shall be 133 ft. above maximum high water (1927) for a navigation width of 500 ft.; vertical clearance for other spans over deep water shall require one span with a minimum clearance of 126 ft. over maximum high water, and the remaining spans with not less than 60 ft. clearance; the location of the principal navigation span shall be near the bank having the straightest and swiftest water.

Between the western limits of New Orleans and Race St. in New Orleans, the bridge may be located at any site, but no piers shall be located between the 30 ft. depth contours; horizontal clearance shall be the full width of the distance between the 30 ft. depth contours at the site of the bridge crossing; vertical clearances shall be as follows: at center, 174 ft. above maximum predicted high water, or 20 ft. on the Carrollton gage; for 750 ft. width over the usually navigated section of the river, the clearance shall be 166 ft. above maximum predicted high water—that is, 20 ft. on Carrollton gage; a minimum over 30 ft. depth contour near each bank shall be 149 ft. above maximum predicted high water. No bridges are to be permitted below Race St. in New Orleans.

Concrete Reinforcing Steel Officers

At the seventh annual meeting of the Concrete Reinforcing Steel Institute, held at Biloxi, Miss., March 16 to 18, 90 members and guests were present. O. W. Irwin, Truscon Steel Co., Youngstown, Ohio, was elected president, Charles M. Gunn, Gunn, Carle & Co., San Francisco, was elected vice-president, and Hugh J. Baker, Hugh J. Baker & Co., Indianapolis, Ind., treasurer.

The Business Outlook

Improvement in general business conditions during the past fortnight is little more than seasonal. Steel expansion shows practically no change from the second week in March. Buyers continue to call only for immediate requirements, unmoved by price increases for the second quarter. Prospects in the automobile and construction industries in the next few months give strength to the view that at least the present rate of activity can be maintained or increased. Construction activity promises to give material support to steel mills in the coming months. Public-works contracts have been let in large volume recently, and the spring months should bring improved demands from highway construction and pipe lines.

—The Business Week, April 1.

Adverse Report on New York's Proposed 57th St. Bridge

An adverse report on the application of the North River Bridge Co. for a rail and automobile bridge across the Hudson River between 57th St., Manhattan and Weehawken, N. J., has been made to the Chief of Engineers by the special army board appointed to consider the proposal. The board holds that the clearances for the projected structure are inadequate.

An application filed two years ago was rejected, the war department insisting upon a center clearance of at least 200 ft. for navigation, whereas the proposal called for a clearance of 184.8 ft. for 300 ft. in the center of the bridge and of 160.6 ft. at the New York pierhead line. Early last year a new application was filed which increased the clearances first contemplated, although not meeting the 200-ft. demand.

The Regional Plan of New York and Its Environs objected to the proposed bridge, contending that tunnels offer a much better solution of traffic problems between New York and New Jersey.

Weld Testing Demonstrated at Lehigh University

The fifth annual welding symposium held at Lehigh University, Bethlehem, Pa., March 27, was unusually well attended. Classes were suspended for the day and students swelled the attendance. The program was divided into three sections. At the first section, Prof. Comfort A. Adams, Harvard University, talked on "Welding Engineering," directing his remarks particularly to the students and stressing the necessity for broad scientific knowledge, not only in welding but in all branches of engineering. In Prof. Adams' opinion, the gap between industry and the scientist, now filled by the research engineer, should be more familiar ground to the practicing engineer in industry. Prof. Gilbert E. Doan, Lehigh University, described the inspection of welds by means of the gamma rays of radioactive substances. The shop and field welding of the nineteen-story Dallas Power & Light Co. building, particularly the inspection phases, were presented by William F. Carson, consulting engineer, of Philadelphia. John J. Bowman, of the Aluminum Company of America, presented a paper on "The Welding of Aluminum."

The afternoon session was devoted to welding and testing demonstrations at the new Packard Laboratory, the Fritz Engineering Laboratory and the school's welding laboratory in Williams Hall. Atomic hydrogen, electric welding, gas welding and thermit welding, were demonstrated, as well as automatic arc welding and spot welding.

At the final session three papers were presented: J. C. Hodge, of the Babcock & Wilcox Co., on "Qualities of Arc Weld Metal"; Lee H. Miller, chief engineer, American Institute of Steel

Construction, on "Battledeck Floor Construction"; J. F. Lincoln, president, Lincoln Electric Co., on "The Shielded Arc."

Dr. Charles Russ Richards, president of Lehigh University, presided at the first session. He stated that it was probable that these welding conferences would be held annually so long as each year produced important progress in the art.

First Quarter Road Lettings in Record-Breaking Volume

Results of the efforts to increase and accelerate public construction in 1930 and 1931 are shown in the accompanying two charts of street and road lettings reported by *Engineering News-Record*. Fig. 1, cumulative weekly lettings, shows: (1) that there was a substantial volume increase in 1930, amounting to 7 per cent more than the 1929 volume; that (2) the lead was attained early in the year and maintained throughout the year, and (3) that the pressure is continuing in 1931, with a lead thus far of 18½ per cent over 1930.

Fig. 2 is the annual picture of contract lettings by weeks. The data are four-week averages, and thus eliminate the casual week-to-week fluctuations. The four curves give the average for the five years 1924-28, the trends in the years 1929 and 1930, and the trend in 1931 to date. The seasonal characteristic is plainly evident. The situation in the first quarter of the various years is particularly interesting at this time. The substantial lead of 1930 over 1929 is shown, as is also the lag in the latter half of 1930. The general trend in 1930 compares closely with the composite for 1924-28, which suggests that 1929 may have been an abnormally slow year in getting started. There is no doubt, however, about 1931, which leads all the other years in the first quarter.

Street and road contracts reported annually by *Engineering News-Record* in the last seven years have ranged from $415,000,000 in 1924 to $615,000,000 in 1928 and $577,000,000 in 1930. These yearly totals, covering all contracts over $25,000, are strictly comparable and reflect the total volume situation in the road-building industry.

Fig. 3 shows annual totals from 1913 to 1930 inclusive. Fig. 4 shows average monthly value of contracts for the years 1926-30, and actual value in January, February and March of 1931, for four public-works groups other than streets and roads. Volume in these groups is satisfactory compared with other years.

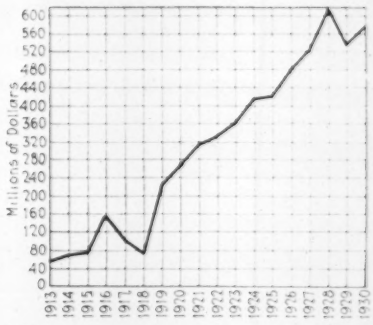
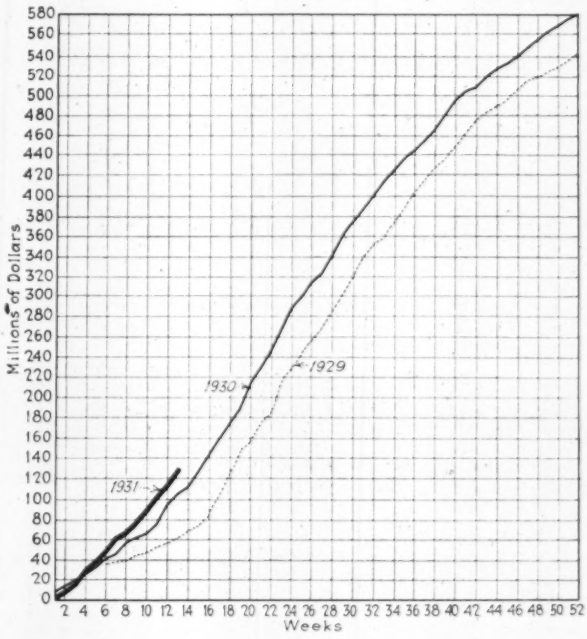
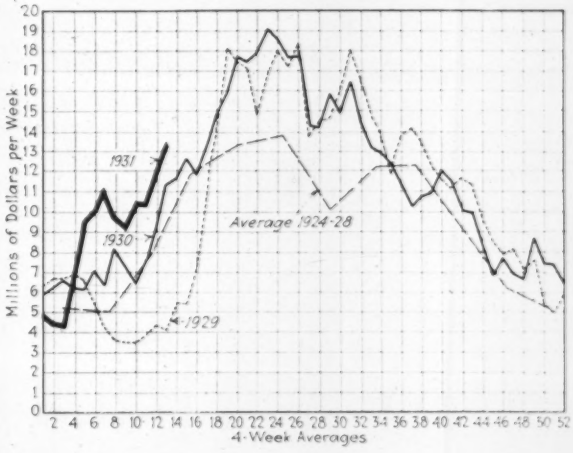


Fig. 3—Annual values of street and road contracts reported by *Engineering News-Record*





Weekly lettings of street and road contracts

Fig. 1 (left), cumulative. Fig. 2 (above), four-week averages.

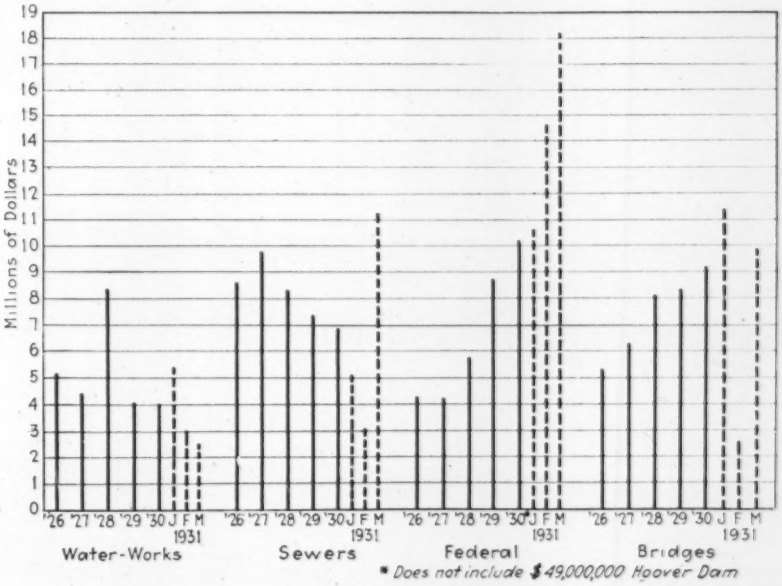


Fig. 4—Average monthly contract lettings for last five years in for groups of public works

New Engineering Positions Created in Baltimore

The board of estimates, Baltimore, has approved the creation of several new positions in the city service, including that of construction works superintendent for the Public Improvement Commission, at a salary of $2,600; assistant structural engineer in the bureau of mechanical-electrical service, at $2,600, and electrical engineer in the bureau of mechanical-electrical service, at $2,400.

Rains in Southeast Augment Domestic Water Supply

Slow, steady rains over practically all of the Southeastern states during Friday and Saturday of last week, preceded by rain and snow the preceding weekend, have relieved practically all domestic water-supply situations in that part of the country. The total precipitation for the period ranged from 2 to 3½ in. In both storms the lack of excessive rates of rainfall, with snow over much of the benefited area in the first one, resulted in relatively high percolation and comparatively even runoff. There has been no appreciable replenishment of hydro-electric storage reservoirs, which remain below all previous records in many cases.

Service for Placing Professional Engineers

As a practical aid in reducing unemployment among business executives and professional engineers, the American Trade Association Executives has established a volunteer placement committee whose services are offered free of charge both to those seeking such positions and to organizations seeking such men, similar to the service rendered by the leading engineering societies for a small fee. At present there are many experienced men available to fill positions. Those in need of professional engineers or technicians are requested to write to Walter V. Brown, Engineering Societies Building, 31 West 39th St., New York City, and those desiring executives are asked to communicate which the American Trade Association Executives, 45 East Seventeenth St., New York City.

Seven Bridges Planned for Quebec, Costing $8,000,000

J. N. Francoeur, minister of public works and labor for the Province of Quebec, has brought forward a measure for the construction of permanent bridges across some of the big rivers of the province, thereby linking the network of the provincial highways into one whole and doing away with detours and ferry services. Two methods of construction are proposed: one from government money, the other by private companies, the bridges to become public property when the tolls collected shall have paid for construction and maintenance.

Massachusetts Gas Tax Raised to Provide Road Funds

Governor Ely, of Massachusetts, has signed the gas tax bill passed by the legislature raising the tax on gasoline from 2c. to 3c. a gallon. This rate will be in effect on May 1, and will continue for two years. The bill also appropriates, out of the money to be raised from the tax, $5,000,000 for highway construction and $1,500,000 for a new office building to house the state department of public works. Nine-tenths of the amount collected from the gas tax increase will be distributed among the cities and towns in abatement of assessments upon them for highway work.

SOCIETY CALENDAR

AMERICAN SOCIETY FOR TESTING MATERIALS, Philadelphia; 34th annual meeting, Chicago, June 22-26.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; spring meeting, Norfolk, Va., April 15.

AMERICAN WATER WORKS ASSOCIATION, New York; annual convention, Pittsburgh, Pa., May 25-29.

AMERICAN WELDING SOCIETY, New York; annual meeting, New York City, April 22-24.

AMERICAN ELECTRIC RAILWAY ASSOCIATION will hold its 50th annual convention and exhibition at Atlantic City, Sept. 26 to Oct. 2. The closing date for the receipt of applications for space at the exhibition is April 30.

CORPORATION OF PROFESSIONAL ENGINEERS of the Province of Quebec at its annual meeting in Montreal on March 25 elected A. E. Decary, provincial superintendent of engineers, president for the twelth time. G. E. Robinson was elected vice-president and Frederick B. Brown secretary-treasurer.

NATIONAL DRAINAGE AND FLOOD CONTROL CONGRESS at its annual meeting in Dallas, Tex., elected as president B. F. Williams, state reclamation engineer, Austin, Tex.; vice-president, L. Mims, Freeport, Tex. The next meeting is to be held at Louisville, Ky., in February, 1932.

NEW JERSEY SEWAGE WORKS ASSOCIATION at the annual meeting March 20-21 at Trenton heard a number of papers dealing with operating procedure, sludge digestion, filter materials, chlorination and maintenance. Registration was 260 persons, some coming from as far distant as Canada, Illinois and North Carolina. All officers were reelected, including Floyd Hoffman, Morristown, president, and John R. Downes, Bound Brook, secretary.

NEW YORK SECTION, American Water Works Association, will hold its spring meeting in Troy, N. Y., on April 22 and 23.

PENNSYLVANIA WATER WORKS OPERATORS' ASSOCIATION will hold a convention at State College, Pa., June 25 and 26. At the opening of the convention a "Trouble Hour" will be held. During this session operators will be requested to tell other operators of their troubles and the methods by which they were corrected; or, if their efforts at correction were unsuccessful, it is hoped that suggestions will be made by those who have overcome similar difficulties. On the evening of June 24, prior to the opening of the regular convention, there will be a talk and discussion on "Elementary Principles of Water Purification" by M. E. Flentje, superintendent of purification for Supervising Engineers, Inc., a subsidiary of the Community Water Service Co.

Obituary

IRA F. ZEIGLER, for more than twenty years sanitary engineer for the Pennsylvania state health department, died of heart disease on March 28 in Carlisle, Pa.

HARRY TRACY BUTTOLPH, of Buffalo, N. Y., head of the city department of construction, devoted principally to street building and maintenance, died on March 13. In the early days of asphalt pavements, Mr. Buttolph was put in charge of their introduction in Buffalo.

MAYNARD SARGENT MCDANEL, engineering assistant, chief engineer's office, Richmond, Fredericksburg & Potomac R.R., at Richmond, Va., died on March 23. Mr. McDanel was 55 years old. His early work was with the Baltimore & Ohio R.R., following which he spent seventeen years in the engineering department of the Atlantic Coast Line R.R., taking service with the engineering department of the R.F.&P. in 1923.

ANDREWS ALLEN, president of the consulting and contracting concern, Allen & Garcia Co., of Chicago, died suddenly in a hotel in Jasper, Ala., on March 21. Mr. Allen was graduated from the University of Wisconsin in 1891. For nine years he was with the Edgemoor Bridge Works, Wilmington, Del. He went to Chicago in 1899 as contracting engineer with the Wisconsin Bridge & Iron Co. and designed many bridges and viaducts for that company. He formed and became president of the Allen & Garcia Co. in 1911. He was a member of the American Society of Civil Engineers and a past-president of the Western Society of Engineers.

BEVERLY L. WORDEN, president of the Cutler-Hammer Mfg. Co., of New York and Milwaukee, died on March 28 at his home in West Orange, N. J., after an illness of several months. Mr. Worden was born in Chicago in 1871 and was graduated in civil engineering from the University of Wisconsin in 1892. After several years' service with the Wisconsin Bridge & Iron Co., Milwaukee, he founded the Worden-Allen Co., of Milwaukee, of which he was president for the ensuing twenty years. In 1909 he established the Lackawanna Bridge Co., of Buffalo, and continued as its president until 1924.

WILLIAM OAKLEY DOLLARHYDE, of Salyersville, Ky., died on Jan. 22, at the age of 39. Mr. Dollarhyde began his engineering experience with the Langhorne & Langhorne Co., railroad contractors, and after five years with this firm he spent four years in charge of outside work and underground surveys for the Consolidation Coal Co. and three years with the Baltimore & Ohio Railway, chiefly in the construction of tunnels, which he made his specialty. From 1919 to 1922 he was chief engineer of construction for the Big Sandy & Kentucky Railway, building 40 miles of new construction through the mountainous country of eastern Kentucky. After the completion of this work he was engaged largely in private practice,

Construction Equipment and Materials

Tool Pulls Road Forms Quickly

Two men should be able to remove 1,000 ft. of road forms per hour with the aid of a special form puller developed by the Moritz-Bennett Corp., Effingham, Ill. The machine, which is essentially a lever mounted on wheels, has a length of 10 ft. and a weight of 115 lb. It is attached to the forms through a link which exerts a vertical

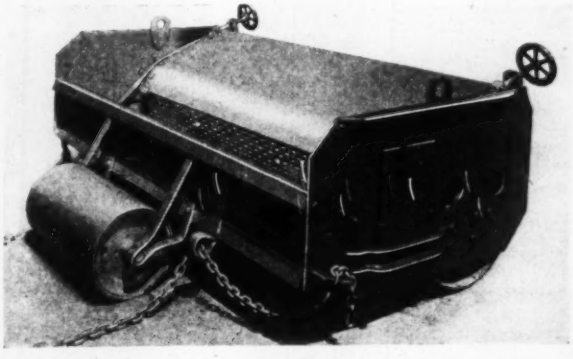
Removing road form with pulling tool

pull, thereby eliminating all chance of bending. Prior removal of stakes or pins is not necessary, as these are pulled with the forms.

Trailer Spreads Base Rock

Development of the roll and brush principle used in the Handy Sandy stone spreader has resulted in the announcement by Highway Service, Inc., New Bedford, Mass., of a rock-spreading unit that will distribute a uniform layer of rock of any size or mixture of sizes on a highway subgrade or other surface. This work is done with a minimum of hand labor and without disturbing the soft base. The spreader, which is known as the Handy Rol-Roc, is attached by chains to the rear of a standard dump truck. The main operating elements are a revolving roll which travels on the spread stone and runs the entire width of the machine, and a wire brush, adjustment of which regulates the depth of the spread and allows the spreading of mixed sizes without a tendency to segregation. The depth of material is not governed by the height of the machine above the ground, hence no variation in thickness of material results from running over a manhole or large stone. Depth of spread can be regulated from 1 to 8 in.

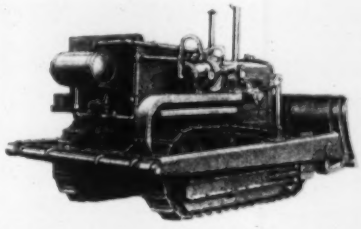
The machine is strongly built for practical road conditions. The main roll revolves on a 3-in. solid steel shaft. A small front roller used to support the machine when not in use carries no weight while it is in operation. Total weight of the machine is approximately 2,400 lb. It spreads 8 ft. wide, and is provided with trap doors at the ends to enable the operator to spread a slight additional width and keep proper clearance between the machine and curbs or shoulders.



Mechanical spreader for large material

Bulldozer Blade Controlled by Hydraulic Cylinder

One of the latest additions to the road-machinery line of the Foote Bros. Gear & Machine Co., Chicago, Ill., is the Bates hydraulic bulldozer, built especially for use in combination with Bates crawler-type road tractors. All operating mechanism of this unit is located below the level of the seat, allowing clear vision to the operator. The oil pump is started or stopped by throwing a small clutch lever located below the driver's seat. Control of the oil pressure in a hydraulic ram through a three-way valve raises or lowers the blade of the bulldozer. One position of the valve handle forces oil to one end of the cylinder and lowers the blade. Another position forces the oil in at the opposite end of the cylinder and raises the blade. The neutral position bypasses the oil back to the tank and holds the blade at any height. The bulldozer is built with a heavy frame with ample ground clearance, and is so attached to the tractor that it does not interfere with normal operation. This frame is bolted to the crawler frame behind the tractor, and the lifting mechanism attached to the tractor frame just behind the engine. The major portion of the weight of the bulldozer is carried in the blade with the pivot point at the rear of the frame. The action of the lifting mechanism throws weight to the front and holds both tractor and bulldozer blade into the ground. Adjustable shoes, mounted on the bulldozer frame just back of the blade, serve as front runners and also prevent



Bulldozer with hydraulic control

the blade from digging into the ground. They are adjustable so that the blade can be raised several inches for filling in and leveling dumps. The moldboard is constructed of heavy, reinforced steel plates and has a wide cutting edge.

⅜-Yd. Convertible Excavator

Following the same general design as its larger machines, the Harnischfeger Corp., Milwaukee, Wis., has started production on a model 200-A excavator with a capacity of ⅜ cu.yd. The machine is sturdily and compactly built, using a large proportion of alloy steels, and is light enough to meet the demand

Gasoline Shovel, ⅜-cu.yd. capacity

for an excavator weighing less than 14 tons. Hoist, swing, crowd and travel speeds are designed for fast operation. Crawlers employ the P&H double sprocket drive on link pins instead of the links themselves. All machinery on the revolving frame is placed with a view to compactness but full accessibility. Drums are mounted on separate shafts, with the jack shaft assembly between. The entire gear train is located on the right side and runs in

(Continued on p. 582)

Current Construction Unit Prices

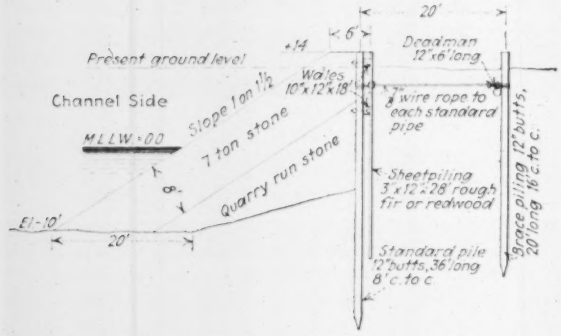
Dredging Fall River Harbor, Mass.

THE harbor of Fall River, Mass., will be dredged from the mouth of Taunton River upstream to Slades Ferry bridge, a distance of 12,000 ft. For the first 6,000 ft. the width is 400 ft., increasing to nearly 1,400 ft. in the next 4,000 ft., and thereafter 100 to 300 ft. Material in the 400-ft. channel section is mud and a mixture of mud, sand and shell, with sand and gravel near grade at both ends; elsewhere, mud with sand and gravel. Final depth is 30 ft. below m.l.w., and existing depths vary from 20 to 30 ft. Estimated quantity is 1,125,000 cu.yd. The site is exposed to storms and heavy wave action, as is also the route to the dumping ground. Mean tide range is 4.9 ft. Traffic is light. The dumping ground is Narragansett Bay, where the depth is 12 fathoms. Distance of transportation is 10.5 to 11.5 miles. Four bids were received Jan. 19, as follows:

	Per Cu.Yd.	Total
Morris & Cummings Dredging Co., New York (contract)	$0.205	$230,605
J. S. Packard Dredging Co., Providence	.211	237,354
Taylor & Pearson, Inc., Jersey City	.220	247,478
Bay State Dredging & Contracting Co., East Boston	.255	286,850
Average of four	$0.223	$250,572

Jetty Work and Dredging in California

REMOVING an existing jetty, constructing new jetties, and dredging in the Noyo River, Calif., comprise a contract let for $178,720 by the U. S. Engineer Office, San Francisco, in January, 1931. The new inner and outer jetties are to be 600 and 620 ft. long respectively; the new channel 10 ft. deep at m.l.w., 100 ft. wide at the bottom,



Section of jetty and bulkhead across sand bar, Noyo River

and 3,400 ft. long. The jetty to be removed is built of pieces of stone weighing as much as 10 tons and of mass concrete without reinforcing, which must be blasted. All material thus obtained will be used in the new work.

Both new jetties are to be of the rubble mound type. The inner, for 420 ft., will be built of material from the existing jetty; the remaining portion of quarry-run stone faced on the channel side with a 6-ft. thickness of 4-ton rock. Dimensions of the first section are: 3 ft. top width, 8 ft. high, 1 on 1½ slope on the channel side and 1 on 1 on the bank side. The second section will have a top width of 6 ft., an average height of 26 ft., and the same slopes.

The outer jetty, except where it crosses a sand bar, will have a top width of 6 ft., a height of 27 ft. and slopes of 1 on 1½. On the channel side there is to be an 8-ft. thickness of stone of 7 tons or more, and on the beach side a similar thickness of 4-ton stones. The remaining triangular core, 15 ft. high with a base 44 ft. wide, will consist of material at least half of which will be composed of 2-ton stones or over.

For a distance of 240 ft. this outer jetty crosses a sand bar. The construction here is to be as shown in the drawing, and the two unit prices received were, respectively, $20 and $21 per linear foot.

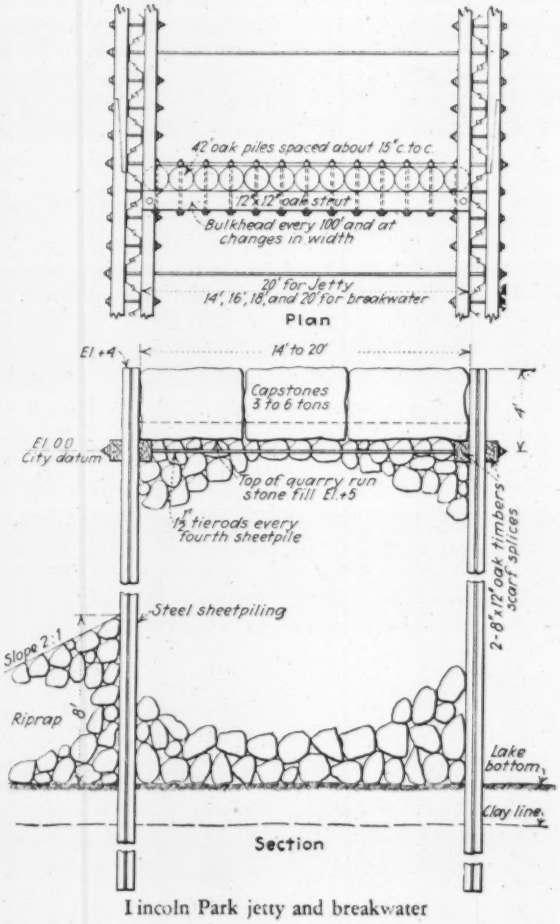
Unit prices are given of the two bidders, both of San Francisco: A, Dutton Dredge Co., 547 Mills Bldg. (contract); B, Healy Tibbitts Construction Co., 64 Pine St.

	A	B
Dredge 110,600 cu.yd. sand, gravel, boulders, logs, slabs	$0.48	$0.60
Remove 1,820 cu.yd. ledge rock	3.10	10.00
Transfer 8,000 ton stone and 750 cu.yd. concrete from old jetty to new (lump sum)	21,200.00	45,000.00
Furnish and place 2,500 tons stone in jetties	3.75	4.50
Construct 240 lin.ft. bulkhead through sand bar	21.00	20.00
	$178,720	$246,860

Breakwater and Jetty in Chicago

COMMISSIONERS of Lincoln Park, Chicago, let a contract in November, 1930, for 2,000 ft. of breakwater in four 500-ft. sections with widths of 14, 16, 18 and 20 ft., respectively, and for 2,490 ft. of 20-ft. jetty. Bids were received on two types of construction, the difference being that one form has sheetpiling on both sides, while the alternate has sheetpiling on the lake side and oak piles on the shore side. Bids averaged 8 per cent lower for the latter, but the all-steel construction was selected. Steel sheetpiling must weigh 25 lb. per sq.ft. of wall, and must have a section modulus of not less than 10 in.³ per linear foot. Lengths are 40 ft. for the breakwater; 42 ft. for the jetty.

After the two lines of piles are driven and tied together, the entire jetty and breakwater will be filled with quarry-run stone. After 30 days of settlement the 3- to 6-ton capstones will be placed on top of the fill. Riprap is to be placed against



Lincoln Park jetty and breakwater

the piles on the lake side. Breakwater and jetty construction are similar except for differences in width. Piles are of white oak, 14 in. at the butt and 8 in. at the tip. All timber is No. 1 merchantable oak, 20 ft. or longer. Quarry-run stone varies from 1,500 lb. to 10@200 lb. Riprap is 100@2,000 lb. stone.

Five bids were received; unit prices are given of the lowest two: A, Great Lakes Dredge & Dock Co., 104 South Michigan Ave. (contract on alternate 2); B, Fitzsimons & Connell Dredge & Dock Co. Hugh E. Young is consulting engineer.

	A	B
500 lin.ft. 20-ft. breakwater	$135.00	$150.00
Alternate	120.00	132.00
500 lin.ft. 18-ft. breakwater	130.00	140.00
Alternate	115.00	124.00
500 lin.ft. 16-ft. breakwater	125.00	130.00
Alternate	110.00	118.00
500 lin.ft. 14-ft. breakwater	120.00	120.00
Alternate	105.00	108.00
14,000 tons additional quarry-run stone fill	2.50	2.00
1,720 lin.ft. main jetty	145.00	155.00
Alternate	125.00	140.00
Connecting section to present breakwater (lump sum)	10,000.00	9,700.00
Alternate	10,000.00	9,200.00
Outer jetty section (670 ft.) (lump sum)	99,000.00	105,000.00
Alternate	95,000.00	94,000.00
Totals	$648,000	$679,300
Alternate	580,000	613,000

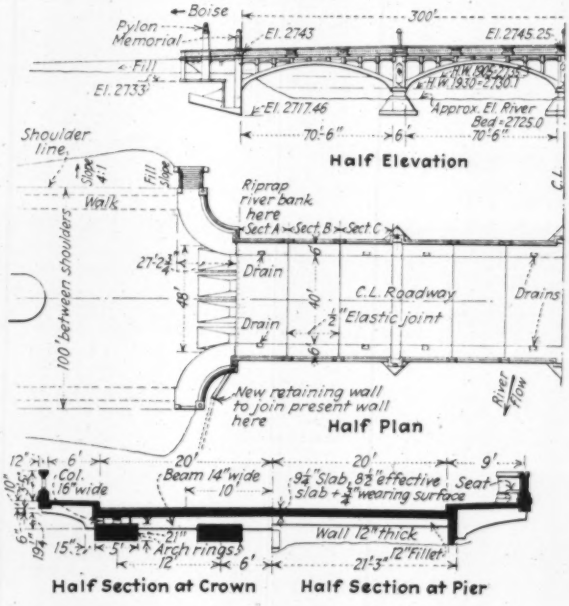
Dredging in Raritan Bay and River

A CHANNEL 25 ft. deep, 300 ft. wide and 11,500 ft. long will be dredged in Raritan Bay and Raritan River, N. J., from the turn in New York and New Jersey channels southeast of Great Beds Light to deep water above the bridges of the New York and Long Branch division of the Central Railroad of New Jersey. Material to be removed consists of 523,000 cu.yd. mud, sand and gravel, of which 90 per cent is mud. Mean tide range is 5 ft. and currents are moderate. Work is exposed to easterly storms. Five contractors submitted estimates as given below:

	Per Cubic Yard
Morris & Cummings Dredging Co.	$0.26
Arundel Corp.	.28
Trimont Dredging Co.	.297
Great Lakes Dredge & Dock Co.	.298
G. H. Breyman & Brother	.60

Concrete Bridge at Boise, Idaho

CAPITOL Boulevard bridge over the Boise River on the Old Oregon Trail highway entering Boise, Idaho, consists of four 75-ft. concrete arch spans, with 40-ft. roadway and two 6-ft. sidewalks and earth approaches. Contract was let in February, 1930, to Morrison-Knudsen Co., Boise, for $84,369. Elevation, plan and half sections at crown and pier are shown in the drawing.



Capitol Boulevard bridge at Boise, Idaho

The largest item is 3,100 cu.yd. of class A concrete and amounts to 64 per cent of total cost. Class A is 1:2:4 mix and contains not less than 1.5 bbl. cement per cubic yard. Reinforcing steel amounts to 17 per cent of total cost. Excavation amounts to 13 per cent. These three items therefore account for 94 per cent of total cost.

Five estimates were received and unit prices are given of the lowest three: A, Morrison-Knudsen; B, Triangle Construction Co., Spokane; C, C. F. Dinsmore & Co., Ogden, Utah. This is federal-aid project 91-D, and is under the supervision of the Idaho department of public works. J. H. Stemmer is commissioner.

	A	B	C
18,000 cu.yd. excav., unel.	$0.18	$0.25	$0.20
1,200 cu.yd. excav., channel, unel.	.30	.50	1.00
3,100 cu.yd. excav., str. bridge, unel.	2.50	3.00	3.00
2,000 sq.yd. overhaul	.05	.05	.03
3,100 cu.yd. cement conc., class "A"	17.50	19.00	21.00
339,000 lb. reinf. steel angles and galv. exp. plates	.04½	.04½	.04
150 cu.yd. riprap, hand placed	3.50	5.00	4.00
60 cu.yd. excav., str. pipe culv.	.75	1.00	1.00
15,000 m.yd. haul on borrow	.21	.20	.12
100 lin.ft. 18 in. corr. pipe in place	1.90	1.60	2.50
140 lin.ft. 24 in. corr. pipe in place	2.70	2.20	4.00
Total	$84,396	$92,933	$96,090

Phoenix, Ariz., Water-System Improvements

WATER-SYSTEM improvements for Phoenix, Ariz., let Dec. 6, 1930, for $2,059,140 to Schmidt-Hitchcock, Phoenix, includes 31½ miles of 24- to 54-in. supply line, constructing a 20,000,000-gal. circular concrete-lined reservoir, and 8 miles of 6- to 12-in. distribution lines in the city. The supply line will deliver 30,000,000 gal. daily to the city, displacing 35 miles of 36-in. redwood pipe now delivering 15,000,000 gal. per day. The accompanying table gives pipe prices submitted by (1) Schmidt-Hitchcock on welded steel and concrete, and by (2) United Concrete Pipe Co., Los Angeles and Phoenix, on concrete pipe, the two contractors on schedule A, which covers the entire project. Schedule B was for contractors who wished to bid on one or more alternates of type.

STEEL OR REINFORCED-CONCRETE PIPE LINE

	Feet	Welded Steel 1	Centrifugally Cast Concrete 1	Centrifugally Cast Concrete 2
130 to 202 + 50 and 203 + 20 to 257				
Item 1, 36-in.	2,150	$7.90	$7.25	$8.00
Item 2-A, 54-in.	5,420	13.75	13.20	13.25
2-B, 48-in.		11.80	11.25	12.00
Item 4-A, 48-in.	28,020	11.40	10.75	10.75
4-B, 45-in.		10.40	9.80	10.00
257 to 288 and 458 to 488				
Item 6, tunnel	5,500			
Timbered and concrete lined	150	48.00	.....	48.00
Untimbered and concrete lined	350	36.00	.....	37.00
Gunited	3,000	28.50	.....	25.00
Unlined	2,000	22.50	.....	22.00
288 to 459				
Item 7-A, 54-in.	14,900	13.75	13.15	12.50
7-B, 48-in.		11.80	11.20	10.75
Item 8, 36-in.	2,200	7.60	7.20	7.50
488 to 818 + 30				
Item 9-A, 54-in.	29,030	12.95	12.55	12.50
9-B, 48-in.		11.25	10.65	10.75
Item 10, 36-in.	4,000	7.30	6.90	7.25
	91,220			
818 + 30 to 1,255 (at reservoir site)				
Item 12-A, 48-in.	39,930	10.90	10.35	10.50
12-B, 45 in.		10.10	9.45	9.95
Item 13, 36-in.	8,300	7.40	6.90	7.00
Reservoir to 1377				
Item 19-A, 48-in.	8,710	10.90	10.40	11.00
19-B, 45-in.		10.10	9.55	10.25
Item 20, 36-in.	4,020	7.40	6.90	7.25

		Welded Steel Dipped and Gunited 1	Welded Steel Dipped and Gunited 2
1377 to City Limits			
Item 21-A, 48-in.	17,550	$12.50	$12.00
21-B, 45-in.		11.60	11.00
Item 22, 42-in.	7,900	11.00	10.00
Item 23, 24 in.	16,023	6.20	
	102,433		

MONO CAST-IRON DISTRIBUTING LINE, LEADITE OR HYDRO JOINTS

Item 25, 12-in.	28,850	$2.70	$2.60
Item 26, 8-in.	2,530	1.99	1.70
Item 27, 6-in.	8,390	1.65	1.40

⅜-Cu.Yd. Shovel

(Continued from p. 579)

an oil bath. Shafts operating in excess of 40 r.p.m. are roller bushed. All clutches are of the internal expanding type. Hoist and crowd clutches are interchangeable, as are the five main outside type brake bands. The boom hoist is of the planetary type with automatic safety load brake. Power is provided by a 45-hp. gasoline engine of four or six cylinders.

Shovel equipment includes a 17-ft. boom and 12-ft. dipper sticks, giving a total dumping height of 17 ft. The patented P&H chain crowd is used. Dragline and crane booms are of lattice box section design with a standard length of 30 ft. The machine is fully convertible for shovel, dragline, clamshell-crane, trench-hoe or skimmer-scoop operation.

Instrument Combines Features of Transit and Level

Demand for a dependable moderate-sized instrument which can be used as either a level or a transit has been met by the Warren-Knight Co., 136 North Twelfth St., Philadelphia, Pa., in the model 38 transit level, an instrument which follows the general design of a transit but differs in the following particulars: (1) The horizontal circle is held in position by automatic spring tension and is set to the zero reading by hand; (2) the telescope cannot be plunged; (3) the telescope is provided with bell metal collars similar to those on a wye level; (4) the tops of the standards form dual bearings—a V and a wye in each—the telescope axle being normally held in the V-bearing by spring clips, with provision for instant release; (5) the telescope and axle can be lifted out of the V-bearings (normal working

Transit-level instrument head

position) and rested in the wye-bearings for checking in the same manner as a wye-level.

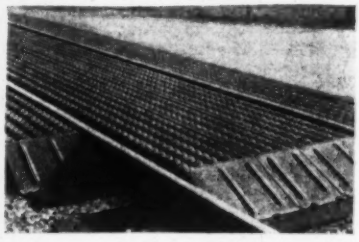
The transit-level offers the advantages of a fully protected graduated horizontal circle with double vernier reading to single minutes; an exceptionally liberal vertical angular range 110 deg. above or below the horizontal; ¾-in. adjustment range on the tripod plate; and 22x telescope. It can be obtained in different models with or without compass or vertical arc as desired.

Portable Electric Tool

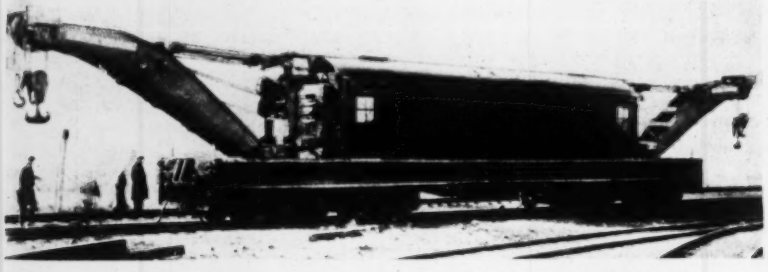
Many applications on the construction job are possible with a new portable electric tool announced by the United States Electric Tool Co., 2490 West Sixth St., Cincinnati, Ohio. Using different types of grinding and polishing wheels, this unit facilitates the removal of cement from forms, sanding, paint removal and polishing operations. The motor is of the universal type, operating on ordinary lighting current of 110 or 220 volts, 60 cycles or less. Construction features include SKF ball bearings, aluminum body and a special switch which is proof against short circuits. Two sizes are available, for use with 7- or 9-in. disks.

Steel-Paved Road Crossings

Metal paving for grade crossings developed by the A. O. Smith Corporation, Milwaukee, Wis., under the name of the Smithsteel crossing consists of pressed-steel units of inverted channel section laid parallel with the rails and locked to metal supports spiked to the ties. The top of each channel is slightly convex and is roughened by ribs and studs to present a non-skid surface. Insulating strips may be inserted between the channels, and end ramps applied to prevent brake hose or other loose parts on trains from catching. A special unit is placed inside each rail to form the flangeway for wheels. Light weight of parts and ease of placing and removal are advantages claimed.



Steel highway crossing



DOUBLE-END GAS-ELECTRIC WRECKING CRANE FOR USE IN THE CLEVELAND TERMINAL

Designed especially to work in tunnels with close clearances, this gas-electric double-end wrecking crane, with a capacity of 105 tons at each end, was demonstrated on March 17, at the plant of the Industrial Brownhoist Corp., Bay City, Mich., before representatives of a number of leading railroads. It will be placed in operation at the Cleveland Union Terminal. A duplicate machine is now under construction for use on the west side electrification project of the New York Central R.R. in New York City. Three independent power supplies are used, any one of which will operate the machine. These consist of two 225-hp. gasoline engines direct-connected to 350-amp. 400-volt d.c. generators, and one 208-cell storage battery. The crane will travel approximately 33 m.p.h. under its own power. It is said to be the first wrecking crane with gas-electric drive.

Business Notes

FORSYTHE BROS., INC., on May 1 will consolidate general offices, warehouse and yards on newly acquired property at 37-11 Vernon Ave., Long Island City, N. Y.

LEWIS ASPHALT ENGINEERING CORP., New York City, has reopened an office at 100 North LaSalle St., Chicago, in charge of James J. Blanchfield, manager.

WOOD PRESERVING CORP., Pittsburgh, Pa., announces the appointment of Reding Putman as advertising manager.

PARADON CO., Arlington, N. J., has appointed the following foreign representatives: F. Hegenbarth, La Ceiba, Honduras; Compania de Machinas do Brazil, Pernambuco and Rio de Janeiro, Brazil; Antiga & Co., Havana, Cuba; Manuel J. Riguero & Co., Ltd., Managua, Nicaragua.

BARBER-GREENE CO., Aurora, Ill., has made several changes in its organization. E. H. Cooper, Kansas City manager, has been appointed ditcher line head for the Western division. New branch managers are Frank Ness, Philadelphia, and D. H. McLean, Cleveland.

JOSEPH T. RYERSON & SON, INC., Chicago, Ill., has appointed E. M. Vehmeyer manager of the Detroit plant. He succeeds W. H. Basse, who has been transferred to Chicago for special sales work.

O. K. CLUTCH & MACHINERY CO., Columbia, Pa., has appointed, as New England distributor, the Herbert G. Gass Co., Greenfield, Mass.

LIDGERWOOD MFG. CO., Elizabeth, N. J., has added the following to its distributor organization: Hedge & Mattheis Co., Boston, Mass.; Brown-Bevis Co., Los Angeles, Calif.; Edward R. Bacon Co., San Francisco, Calif.; Funkhouser Equipment Co., Kansas City, Mo.; and Thorman W. Rosholt Co., Minneapolis, Minn.

Business Side of Construction

Contracts 15 Per Cent Below First Quarter 1930

Engineering construction contracts totaled 663 millions for the first quarter of 1931, compared with 826 in 1930 and 1,122 in 1929. This drop of 15 per cent from last year occurred entirely in the Middle Atlantic and Southern states and was in private work. In New England and the Middle West volume was exactly the same as a year ago. West of the Mississippi River there was an increase of 15 per cent, that in the Far West amounting to 26 per cent. The decreases were 41 per cent in the Middle Atlantic states and 22 per cent in the South.

Building construction is down 31 per cent: residential 6; industrial and other buildings 42 per cent each. Other structures, including public-utility work, are down 37 per cent.

Public-works contracts are 24 per cent heavier than last year, due to a 22 per cent gain in highway work and a very heavy increase in federal construction except buildings. Volumes of the last two years balance exactly for waterworks, sewers, excavation and unclassified. Public bridges totaled 24 millions this year and 22 millions last year, buildings 56 and 70 millions respectively.

Dollar Cement in Mid-West

Price war brings sharp declines and active bidding

During the last six weeks cement prices have broken sharply. The most pronounced cuts were for state highway department cement in large quantity. Though the best examples of the situation are found in the Middle West, there are noteworthy exceptions. One of these is the $1.10 mill price net (i.e. without bags) accepted for the Hoover Dam cement. This net price was bid by the Monolith Portland Cement Co., whose mill is at Monolith, Calif., 400 miles from the site.

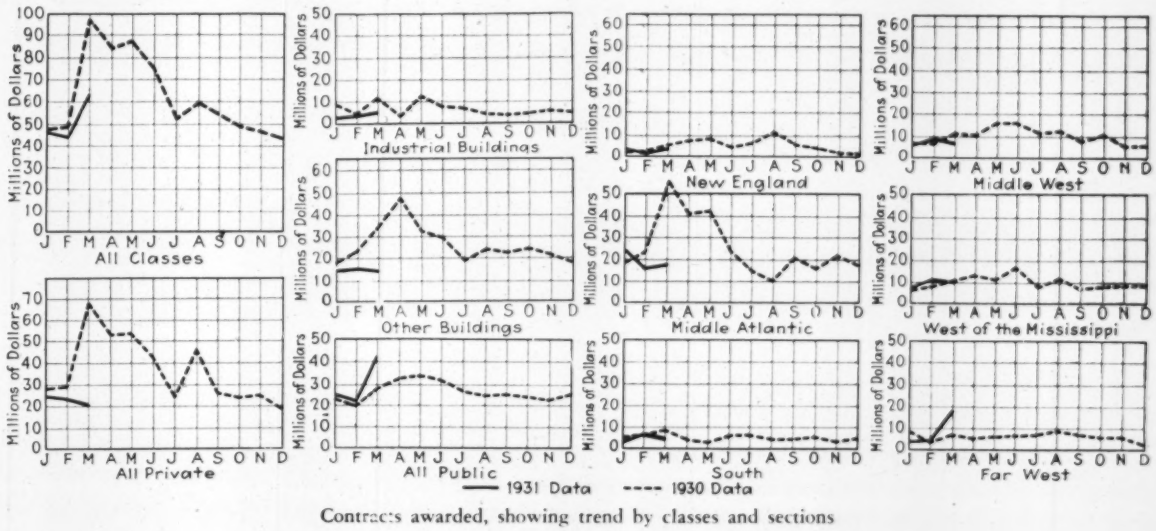
Oklahoma received bids Feb. 3 on 1,000,000 bbl. of bulk cement, and the Oklahoma Portland Cement Co. was awarded the contract for 950,000 bbl. on bids which quoted destination prices (averaging $2.08) when mill price was asked. All companies in this, the first letting of the year, quoted delivered prices except the Monarch Cement Co., Humboldt, Kan., and Monarch was awarded the remaining 50,000 bbl. at $1.40 at factory. This $1.40 price averages $1.78 delivered at various stations.

Becauses of the wide range in the bidding a controversy ensued among governor, highway commission and manufacturers, and it was decided to readvertise for March 9. Thereupon the Oklahoma company obtained a restraining order from the district court and requested a permanent injunction to prevent new contracts. This company then made a private agreement with two

ENGINEERING CONSTRUCTION CONTRACTS REPORTED IN MARCH, 1931

Thousands of Dollars (000 omitted)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States			Canada, March 1931
							March, 1931	Three Months		
								1931	1930	
Water-works	$372	$689	$180	$241	$137	$923	$2,542	$11,083	$12,107	$927
Sewers	182	3,596	141	6,548	677	156	11,300	19,422	19,306	748
Bridges, public	179	4,984	532	2,016	1,779	262	9,752	23,657	22,339	276
Excavation	51	381	269	236	167	18	1,122	5,798	6,246	
Streets and roads	1,829	14,256	8,559	7,958	16,967	3,819	53,388	129,690	106,050	598
Federal government	2,396	5,104	5,340	1,280	2,169	49,936	66,225	91,372	28,249	
Unclassified, public	5,908	1,834			39	470	10,247	32,014	33,148	309
Buildings, public	1,010	5,125	535	4,292	1,000	2,387	14,349	56,261	69,722	1,293
Total public	11,927	35,969	15,556	24,567	22,935	57,971	168,925	369,297	297,167	4,151
Buildings, industrial	656	3,243	2,237	897	591	8,942	16,566	44,820	106,365	2,818
Buildings, commercial	3,395	32,601	1,000	4,100	2,062	2,970	46,128	150,876	261,890	2,319
Bridges, private					25		25	255	4,420	
Unclassified, private	540	560	427		14,132	43	15,702	92,835	156,315	400
Total, private	4,591	36,404	3,664	4,997	16,810	11,955	78,421	293,786	528,990	5,537
March total, 4 weeks	**16,518**	**72,373**	**19,220**	**29,564**	**39,745**	**69,926**	**247,346**			**9,688**
February, 1931, 4 weeks	5,893	59,862	21,583	35,924	38,115	17,165	178,542			11,091
March, 1930, 4 weeks	20,093	231,695	31,814	41,279	42,994	23,958	391,833			17,751
Three months, 1931	35,549	250,597	59,004	99,300	110,560	108,073		663,083		33,469
Three months, 1930	36,140	422,985	76,112	99,921	106,199	84,800			826,157	45,633



Contracts awarded, showing trend by classes and sections

members of the state highway commission to deduct 15c. from the contract price, but the two members of the commission withdrew from the agreement on notice that the Bureau of Public Roads would not approve it. New bids were asked for March 20 on 1,000,000 bbl. of bulk cement delivered at various points; the same two companies were low: Monarch at $1.53 for 700,000 bbl., and Oklahoma at $1.57 for 300,000 bbl. Letting was enjoined by court order until March 30 and will probably be readvertised.

Missouri took bids early in March for its 1931 cement, amounting to 1,750,000 bbl., the same as in 1930. The companies bidding were Missouri and Alpha of St. Louis, Marquette of Cape Girardeau, Mo., and Ash Grove of Kansas City. The low bids averaged $1.70 net delivered, compared with $2.10 in 1930.

Indiana received bids March 20 on 1,750,000 bbl. The low averaged $1.36 net delivered, compared with $1.65 a year ago, and allotments were made to ten companies: Lone Star, Limedale, 650,000 bbl.; Universal, Buffington, 475,000; Lehigh, Mitchell, 325,000; Wabash, Stroh, 25,000; Speeds, Louisville, 100,000; Kosmos, Louisville, 25,000; Consolidated, Cement City, Mich., 25,000; Marquette, LaSalle, Ill., 40,000; Medusa, Sandusky, Ohio, 75,000; Southwestern, Dayton, 10,000. Lone Star was also awarded 20,000 bbl. high-early-strength cement.

"Never before has the department been able to buy cement at such a wide price range," said W. J. Titus, chief engineer. "Largest spread in the past was 10c. per barrel, whereas this year it was approximately twice as great, with any number of firms competing rather than a single one breaking the price for a restricted area."

Wisconsin received bids Feb. 18 on about 1,400,000 bbl., with range of $1.68 to $2.05 f.o.b. 115 stations in the state. These bids were rejected and new bids were taken March 20, with range of $1.34 to $2.02 net. Lehigh Portland Cement Co. was low, with range of $1.34 to $1.65, and an average of about $1.45. At the earlier opening this company's prices were $1.74 to $2.04, with an average low of $1.86. A comparison of the Lehigh prices on the two dates is given below for the largest amounts.

	Bbl.	Feb. 18, 1931	March 20, 1931
Waldo	72,000	$1.78	$1.44
Carrollsville	43,500	1.74	1.40
Altoona	37,302	1.95	1.55
Luxemburg	42,200	1.87	1.53

At the first opening there were thirteen bidders and practically 100 per cent agreement in prices. At the second opening there were twelve bidders and independent bidding as shown below:

	Waldo	Carrollsville	Altoona	Luxemburg
Universal	$1.54	$1.50	$1.71	$1.63
Marquette	1.53	1.49	1.65	1.59
Lehigh	1.44	1.40	1.55	1.53
Medusa	1.56	1.49	1.64	1.60
Alpha	1.61	1.53	1.72	1.67
Manitowoc	1.51	1.53	1.66	1.47
Western Lime & Cement	1.49	1.42	.....	1.59
Petoskly	1.51	1.53	1.66	1.47
N. W. State	.....	.....	1.79	.....
Dewey	1.78	1.74	1.95	1.87
Huron	.....	.....	1.81	.....
Lone Star	1.61	1.53	1.72	1.67

The state has decided to purchase, but allotments to the various companies have not yet been made.

Cook County, Ill., received bids March 26 on 750,000 bbl. for delivery at 49 stations. There were seven bidders: five identical and two high. The low price of $1.35 was submitted by the five companies for 30 of the stations. The two other companies bid $1.96 and $2.05 respectively. The mill price is $1, which is the same as was bid that day at Springfield for state cement. Mill price at the first of the year was $1.62, and a year ago $1.70.

Materials Price Trend Down

A glance through the three price pages following this section gives an indication of the trend of the material market. The italic figures, or decreases, far outnumber the roman figures, or increases. The specific situation as regards the principal materials is given briefly below.

Structural Steel — Asking price is $1.70, but business continues to be transacted at $1.65, compared with $1.80 a year ago. Three very large awards were made in March: 125,000 tons for the New York music center; 120,000 tons for the Pennsylvania R.R.; 50,000 tons for Hoover Dam. Road work, 22 per cent above last year's volume, is using considerable reinforcing, and the Pittsburgh price of bars has been raised 10c., to $1.75.

PRODUCTION OF PRINCIPAL MATERIALS

	First Two Months 1931	First Two Months 1930	Per Cent Change in 1931
Fabricated Structural Steel:			
Bookings, tons, 2 mos	321,600	506,400	—36.5
Ship'mts, tons, 2 mos.	338,800	510,000	—33.7
Unfilled Steel Orders:			
On books of U. S. Steel Corp., Feb. 28, tons	3,965,194	4,479,748	—11.4
Steel Ingots:			
Production, tons	5,010,524	7,874,417	—36.3
Cement:			
Pr'de'n, bbls., 2 mos.	12,515,000	16,660,000	—24.7
Shp'ts., bbls., 2 mos.	9,740,000	11,967,000	—18.7
Stocks, bbls., Feb. 28	28,478,000	28,249,000	+0.7
Lumber (softwoods):			
Production, M ft., 2 mos.	1,249,899	1,857,076	—33.0
Shp'ts., M ft., 2 mos.	1,482,086	1,902,243	—22.1
Orders received, M ft., 2 mos.	1,487,703	1,968,822	—24.5
Orders unfilled, M ft., Feb. 28	711,320	1,020,027	—30.3
Mill stocks, M ft., Feb. 28	4,423,261	4,219,034	+5.0
Commercial Steel Castings:			
Orders, tons, 2 mos.	86,697	215,919	—59.8
Pr'detn., tons, 2 mos.	95,473	216,637	—55.9
Electric Hoists:			
Orders, No., 2 mos.	619	810	—23.6
Enameled Sanitary Ware:			
Orders, No., 1 mo.	220,466	131,594	+66.5
Fabricated Steel Plate:			
Orders, tons, 1 mo.	23,275	57,083	—59.3
Malleable Castings:			
Prod'tn., tons, 2 mos.	64,635	127,323	—49.5
Shp'mts, tons, 2 mos.	64,167	117,791	—45.7
Orders, tons, 2 mos.	64,937	119,615	—45.7
Porcelain Plumbing Fixtures:			
Shp'mts., No., 2 mos.	8,296	9,567	—13.2
Ord. rece., No., 2 mos.	10,129	17,051	—40.5
Orders unfilled, No., Feb. 28	30,526	32,781	—6.7
Stocks, No., Feb. 28	30,004	39,352	—23.6
Prepared Roofing:			
Shp'mts., sqrs., 1 mo.	1,644,605	2,382,804	—31.0
Range Boilers:			
Prd'ctn., No., 1 mo.	54,772	56,121	—2.5
Ord. rec'd., No., 1 mo.	51,217	58,644	—12.6
Orders unfilled, No., Jan. 31	20,254	31,724	—36.4
Shp'mts., No., 1 mo.	58,703	59,902	—2.0
Stocks, No., Jan. 31.	20,617	22,514	—8.4
Steel Boilers:			
Orders, No., 1 mo.	598	942	—36.5
Terra Cotta:			
Orders, tons, 2 mos.	6,457	13,948	—53.7
Vitreous China Plumbing Fixtures:			
Ord. rece., No., 1 mo.	250,183	200,253	+25.0
Orders unfilled, No., Jan. 31	337,158	436,348	—22.7
Ship'mts., No., 1 mo.	172,334	205,673	—16.5
Stocks, No., Jan. 31.	594,886	632,740	—6.0
Common Brick (in container cars):			
Shipments into New York City, No., 2 mos.	37,843,000	21,599,000	+76.0

CURRENT BUILDING AND CONSTRUCTION TRADES WAGE RATES PER HOUR

Advances since last month are indicated by **heavy type**, declines by *italics*

Cities	Bricklayers	Carpenters	Hoisting Engineers	Hod Carriers	Pile Drivers	Structural Iron Workers	Common Labor*
Atlanta	$1.25@1.40	$0.60@.70	$0.60@1.00	$0.50	.....	$0.75@1.25	$0.25@.35
Baltimore	1.75	1.00@1.10	1.00@1.37½	1.00	$0.65	1.00@1.25	.30
Birmingham	*1.25*	*.55*	*1.00*	*.30*	.....	*1.00*	*.25*
Boston	1.50	1.37½	1.37½	.85	1.27½	1.37½	.45@.80
Cincinnati	1.62½	1.40	1.40	1.00	1.40	1.40	.35@.60
Chicago	1.70	1.62½	1.62½	.97½	1.62½	1.62½	.97½
Cleveland	1.62½	1.37½	1.37½	.87½	1.10	1.50	.35@.60
Dallas	1.75	1.12½	1.25	.35@.75	1.25	1.25	.35@.50
Denver	1.50@1.62½	1.25	1.25@1.37½	.87½@1.00	.....	1.25	.20@.62½
Detroit	1.56½	1.00@1.25	1.00@1.10	.90	1.00@1.10	1.00@1.25	.50@.60
Kansas City	1.50	1.37½	1.37½	.90	1.50	1.37½	.30@.75
Los Angeles	1.37½	1.00	1.00	.75	.87½	1.00	.50
Minneapolis	1.30	.90	.90@1.00	.80	.....	1.00@1.25	.50@.65
New Orleans	1.00	50@75	1.25	.75	.80@1.00	1.12½@1.25	.20@.35
New York	1.92½	1.65	1.92½	1.03½	1.78¾	1.92½	1.03½
Philadelphia	1.75	1.25	1.02½@1.36	.70@1.12½	1.00	1.37½@1.62½	.40@.50
Pittsburgh	1.75	1.50	1.50@1.56½	1.12½	.....	1.50	.40@.80
St. Louis	1.75	1.50	1.60@1.75	1.15@1.25	1.25	**1.75**	.30@.87½
San Francisco	1.37½	1.12½	1.12½	.87½	1.12½	1.37½	.68¾
Seattle	1.50	1.12½	1.12½@1.25	1.00	1.25	1.25	.70
Average	*1.53*	*1.19*	1.28	*0.8615*	1.20	1.33	*0.5359*
Montreal	1.25	.80	.75	.....	.90	1.00	.30@.35

*Minimum rates are mostly non-union and for construction other than buildings.

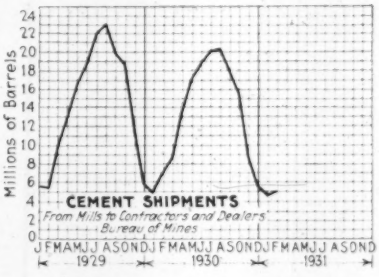
Cement—The price war in the Middle West, described on page 583, has not yet extended to the East, but it has profoundly unsettled the industry.

Brick—The many plant shut-downs have brought supply nearer in line with need, and price cutting is less severe. This is evidenced by three advances: 50c. at Minneapolis and Philadelphia and $1 at Los Angeles. Prices in these cities are respectively $10, $16 and $11, compared with $12.75, $16 and $9 a year ago.

Lumber—Mill reserves are heavy; yard stocks are light, and substantial replenishment is expected soon except in the Gulf region. The big price drop of the month was at New York; in timbers: pine 3x12s down $8, to $65 delivered; fir down $2, to $37. Prices a year ago were $75 for pine, $42 for fir. A cargo of Russian lumber is due at Providence April 9, to test the treasury department ban. The price is expected to be $21 at dock.

Wood Block—Lower prices of wood and oil has lowered price 20c. per square yard at Chicago.

Lime—Advanced prices of early March have not held. The drop on


Millions of Barrels
CEMENT SHIPMENTS
From Mills to Contractors and Dealers
Bureau of Mines
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1929
1930
1931

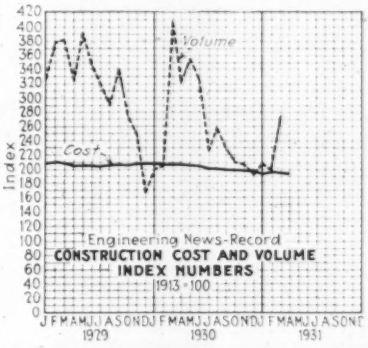
common amounts to 25c. per barrel at Birmingham and 35c. at Detroit.

Cast-Iron Pipe—Cutting under reported to extent of $1 per ton on mill base. There is lack of demand and all inquiries are for small lots.

Materials movements are considerably below last year's volumes. There are three notable exceptions: brick shipments, up 76 per cent; orders for enameled sanitary ware, up 66 per cent; orders for vitreous china plumbing fixtures, up 25 per cent. Mill stocks of lumber and cement continue to pile up.

Construction Cost and Volume Index Numbers

Costs declined 1.5 per cent during March and are now 7.2 per cent below the levels of April, 1930. The volume index is up 40.4 per cent, compared with that of February and is 31.8 per cent under that of March, 1930.


Index
Volume
Cost
Engineering News-Record
CONSTRUCTION COST AND VOLUME
INDEX NUMBERS
1913 = 100
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1929
1930
1931

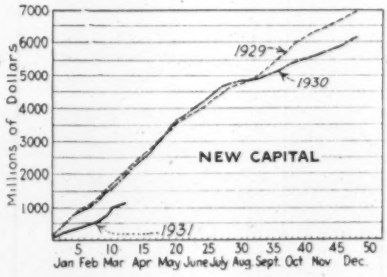
E. N.-R. Cost		E. N.-R. Volume	
April, 1931	**191.63**	**March, 1931**	**278**
March, 1931	194.51	Feb., 1931	198
April, 1930	207.12	March, 1930	408
1930 (average)	202.85	1930 (average)	260
1929 (average)	207.02	1929 (average)	317
1913 (average)	100.00		
1930		1930	
January	208.96	January	199
February	206.46	February	204
March	206.80	March	408
April	207.12	April	320
May	205.86	May	354
June	203.36	June	324
July	200.95	July	226
August	200.95	August	259
September	199.58	September	232
October	198.72	October	211
November	198.54	November	207
December	196.86	December	192
1931		1931	
January	194.48	January	208
February	196.61	February	198
March	194.51	March	278
April	191.63		

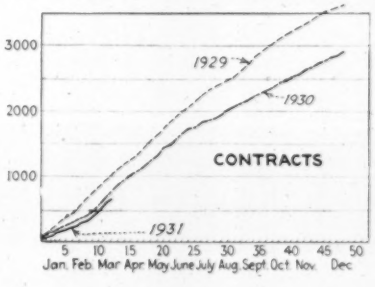
New Capital Issues 40 Per Cent Below Last Year's Total

This week's new capital issues for construction purposes total 141 millions and include four particularly large issues: $50,000,000 Southern Pacific 4½s; $13,486,000 Los Angeles 4s; $26,000,000 Public Service Gas & Electric (Newark) 4s; $25,000,000 Youngstown Sheet & Tube 5s.

The accumulated capital total is 1,157 millions, compared with 1,940 last year, a drop of 40 per cent. The March average was 135 millions, compared with 174 a year ago, a drop of 22 per cent.

Contracts for engineering construction totaled 247 millions in March, compared with 297 a year ago. The cumulative total for the year is 662 millions, compared with 780 millions in 1930, a drop of 15 per cent.





Local Labor Conditions

The nationwide average hourly rate paid skilled building trades mechanics is $1.35⅝, compared with $1.36½ a month ago and $1.37⅞ a year ago. Average common labor rate is 53.59c., compared with 53.71 a month ago and 56.46 a year ago. Some local notes are given below.

Boston—State gasoline tax increase of 1c. suggested as unemployment relief. Strike March 20 on West Newton courthouse because of non-union labor furnished by relief committee.

New York—750,000 unemployed, according to the emergency employment committee. Park improvement program will employ 3,600 men three days per week at $5. The $250,000,000 Rockefeller music center will require 25,000 men for construction and 10,000 for maintenance.

Philadelphia—Navy yard employees offered 20 to 40 per cent wage reduction or six to eight months' layoff.

Pittsburgh—Allegheny County emergency association provided work in March for 1,100 on streets and sewers. Painters' rates hold at $12 per day. Overtime pay has been reduced from double time to time and a half.

Washington—Davis act requiring contractors on federal buildings everywhere to pay local scale effective April 3. Department of justice moved March 10 to expedite condemnation proceedings on properties required for public projects.

Atlanta—Bricklayers walked out March 9 on a project because employers wanted a 20 per cent wage reduction and would not accept a 10 per cent cut.

Birmingham—Wages of most trades reduced 25c.

Dennison, Tex.—Unions requested $1 per day cut in skilled wages, with common labor rates unchanged.

Columbus, Ohio—Bill before Senate empowering public officials to specify in contracts that prevailing rates be paid.

St. Louis—75,000 unemployed on March 20, compared with 110,000 on Feb. 1. Two-thirds of building mechanics not working at their trades.

Chicago—92,000 mechanics, or 80 per cent of total, unemployed.

Minneapolis—Measure in state Senate for 48-hour week and minimum wage of 45c. on highway work.

Denver—State highway department will require contractors to pay minimum of 50c. for common labor on road work and to state the rate in bidding.

Las Vegas, Nev.—Hoover Dam will require 1,000 men for the present, and these are already employed by the companies which will do the work.

Los Angeles—$5,000,000 relief bonds provided public work in March for 2,000 laborers.

Current Prices of Construction Materials

Price advances since last month are indicated by **heavy type**; declines by *italics*

Building Materials

PORTLAND CEMENT—Prices per barrel, for cement in cloth, *without including charge for four bags at 10c. each*. Cash discount not deducted. Prices are delivered by truck to contractors at site of job:

	Apr. 2, 1931	One Mo. Ago	One Yr. Ago
Atlanta	$2.60	$2.60	$2.49
Baltimore	2.60	2.60	2.60
Birmingham	*2.40*	2.60	2.60
Boston	2.30	2.30	2.50
Chicago	2.10	2.10	.....
Cincinnati	2.26	2.26	.....
Cleveland	*1.80*	2.00	.....
Dallas	2.15	2.15	2.15
Denver	2.20	2.20	2.61
Detroit	2.05	2.05	.....
Jersey City	*2.19*	2.33	2.60
Kansas City	2.50	2.50	2.65
Los Angeles	1.92	1.92	1.92
Minneapolis	2.55	2.50	.....
Montreal	2.20	2.20	.....
New Orleans	2.35	2.35	2.65
New York	2.10	2.10	2.30
Philadelphia	**2.25**	2.15	2.10
Pittsburgh	**2.50**	2.15	.....
St. Louis	2.15	2.15	2.45
San Francisco	2.64	2.64	2.64
Seattle	2.25	2.25	2.70

Current mill prices per barrel, in carloads, without bags, f.o.b.:

Alpena, Mich	$1.55	Limedale, Ind	*$1.10*
Buffington, Ind	1.44	Mason City, Ia	1.66
Hannibal, Mo	1.66	Norfolk, Va	*1.24*
Houston, Tex	1.94	Northampton, Pa	1.51
Hudson, N. Y	1.61	North Birmingham, Ala	*1.51*
Ironton, Ohio	1.56	Steelton, Minn	1.61
Iola, Kan	1.56	Universal, Pa	1.46
La Salle, Ill	1.49	Wyandotte, Mich	1.50

SAND AND GRAVEL—Per ton, delivered by dealers. Weight of sand per cu.yd., 1½ tons; gravel, 1½ tons, unless otherwise specified in pounds:

	Gravel		Sand
	1½ In.	¾ In.	
Atlanta	$3.25	$3.25	$2.50
Baltimore	2.35	2.55	2.08
Birmingham, per cu.yd., 2,600 lb	3.50	3.50	3.00
Boston	1.75	1.75	1.15
Chicago, per cu.yd	2.00	2.00	2.00
Cincinnati	1.75	1.75	1.50
Cleveland, per cu.yd., 3,000 lb	2.60	2.60	2.50
Dallas, per cu.yd., 2,750 lb	3.00	3.00	2.50
Denver, per cu.yd., 2,700 lb	1.95	1.95	1.35
Detroit	2.50	1.85	1.65
Kansas City	1.75	1.75	1.75
Los Angeles	1.90	1.90	1.40
Minneapolis, per cu.yd., 2,800 lb	2.40	2.40	1.10
Montreal	1.25	1.25	1.25
New Orleans, per cu.yd., 2,700 lb	2.95	2.95	2.50
New York, per cu.yd	3.40	3.40	2.15
Philadelphia	*2.00@2.75*	*2.00@2.75*	**1.90@2.40**
Pittsburgh	1.55	1.55	1.75
St. Louis	**1.55**	1.40	1.00@1.20
San Francisco	1.75	1.75	1.75
Seattle, per cu.yd., 3,200 lb	1.75	1.75	1.65

Note: New York gravel weighs 2,800@3,000 lb. and sand, 2,700 lb. per cu.yd

CRUSHED STONE—Per ton, delivered by dealers. Weight per cu.yd., 1½ tons, unless otherwise specified in pounds:

	1½ In.	¾ In.
Atlanta	$3.25	$3.25
Baltimore	2.60	2.80
Birmingham, limestone, per cu.yd	3.00	3.25
Boston	2.00	2.00
Chicago, limestone, per cu.yd., 2,500 lb	2.00	2.00
Cincinnati	2.25	2.25
Cleveland	2.60	2.60
Dallas, per cu.yd., 2,500 lb	3.25	3.25
Denver, granite, per cu.yd., 2,700 lb	2.50	2.50
Detroit, limestone	*2.00*	*2.00*
Kansas City	1.90	1.90
Los Angeles	1.90	1.90
Minneapolis, limestone, per cu.yd., 2,600 lb	2.40	2.40
Montreal	1.90	2.10
New York, limestone, per cu.yd	3.40	3.40
Philadelphia, limestone	2.30@3.15	2.30@3.15
Pittsburgh	.....	.....
St. Louis	1.40	1.40
San Francisco, trap rock	1.65	1.65
Seattle, per cu.yd., 2,700 lb	3.00	3.00

CRUSHED SLAG—Prices for carloads, per net ton, at plant:

	1½-In.	¾-In.	Roofing	Sand
Birmingham, Ala	$0.90	$1.15	$2.05	$0.55
Buffalo District	1.25	1.35	2.25	1.25
Cleveland, Ohio	1.10	1.10	.....	1.30
Western Pennsylvania	1.25	1.25	2.00	1.25
Toledo, Ohio	1.10	1.10	1.10	1.00
Youngstown District	1.25	1.35	2.00	1.25

CONCRETE BLOCKS—Manufacturers' quotations on standard, 8x8x16-in., hollow, delivered to job, each:

Boston	$0.18@$0.20	Minneapolis	$0.11
Brooklyn and Queens	.12@ .14	New Orleans	.20
Cleveland	.16@ .17	Philadelphia	.18@.25
Denver	.22	Pittsburgh	.17@.23
Detroit	*.12*	St. Louis	.17
Kansas City	.18		

HOLLOW TILE—Building tile per block, delivered by dealers to contractor in lots of 2,000 pieces or over:

	4x12x12	6x12x12	8x12x12	10x12x12	12x12x1
Atlanta	$0.14	$0.18	$0.24	$0.30	$0.36
Baltimore	.105	.....	.20	.....	.26
Birmingham	*.089*	*.122*	*.167*	*.219*	*.25*
Boston	.08	.117	.152	.21	.35
Chicago	.068	.0935	.1275	.1647	.183
Cincinnati	.06815	.09485	.129	.165	.184
Cleveland	.048	.066	.09	.117	.13
Dallas	.103	.136	.194	.251	.306
Denver	.0975	.135	.175	.2125	.25
Detroit	.098	.135	.184	.24	.265
Kansas City	.088	.11	.158	.24	.265
Los Angeles	.085	.122	.175	.232	.285
Minneapolis	.0611	.081	.10605	.1302	.1737
New Orleans	**.105**	**.145**	**.195**	**.30**	**.34**
New York	.0864	.1296	.162	.....	.....
Perth Amboy, N. J.(f.o.b.)	.....	.....	.....	.2388	.2956
Philadelphia	.105	.14	.215	.28	.34
Pittsburgh	*.0545*	*.0765*	*.1035*	*.145*	*.178*
St. Louis	.075	.10	.14	.175	.21
San Francisco	.108	.156	.255	.....	.....
Seattle	.085	.115	.18	.....	.....

BRICK—Prices delivered by dealers per thousand, are as follows:

		Paving F.O.B.	
	Common	3x8½x4-In.	3½x8½x4-In.
Atlanta	$17.00	$42.00	.....
Baltimore	13.00	40.00	$46.00
Birmingham	*12.00*	31.00	.....
Boston	14.50	43.00	47.00
Chicago	12.00	42.00	45.00
Cincinnati	16.00	35.00	37.00
Cleveland	12.00@14.00	33.00	36.00
Dallas	14.50	.....	28.25
Denver	9.00@10.00	.....	.....
Detroit	14.50@15.50	35.50	37.50
Kansas City	15.00	.....	.....
Los Angeles	**11.00**	.....	.....
Minneapolis	**10.50**	.....	.....
Montreal	20.00	.....	.....
New Orleans	**14.50**	38.00	45.00
New York	13.00	45.00	50.00
Philadelphia	**16.00**	40.00	45.00
Pittsburgh	**17.00**	**41.00**	**58.00**
St. Louis	12.00	36.00	36.00
San Francisco	12.00	45.00*	.....
Seattle	14.00	48.50†	61.00‡

*2½x8½x4 in. †2½x8½x4. ‡3½x8½x4.

FACE BRICK—Price delivered to job, New York, average grade, rough, red, per thousand $28.00

LIME—Prices delivered by dealers to job:

	Hydrated, per Ton		Lump, per Barrel	
	Finishing	Common	Finishing	Common
Atlanta	$23.00	$15.50	.....	.....
Baltimore	22.00	14.00	.....	.....
Birmingham	22.00	16.00	$3.00†	*$1.25†*
Boston	22.00	14.50	4.00*	3.10*
Chicago	17.00	14.50	15.00‡	15.00‡
Cincinnati	13.05	10.70	.....	.....
Cleveland	14.00	12.00	2.50†	2.50†
Dallas	20.00	.....	2.35†	.....
Denver	32.00	23.75	3.80*	3.00*
Detroit	*14.00*	*12.00*	*1.75†*	*1.65†*
Kansas City	19.50	.....	2.20†	.....
Los Angeles	18.90	16.00	2.85†	14.00‡
Minneapolis	25.50	21.00	.....	1.70†
Montreal	19.75	.....	.....	15.00‡
New Orleans	25.00	15.50	2.65†	1.95†
New York	21.00	15.50	4.10*	3.15*
Philadelphia	22.00	15.00	.....	.....
Pittsburgh	20.00	15.00	4.25*	.....
St. Louis	24.00	18.00	2.75†	15.00‡
San Francisco	20.00	20.00	.....	1.85†
Seattle, paper sacks	35.00	24.00	.....	2.80†

*Per 280-lb. bbl. (net). †Per 180-lb. (net). ‡Per ton.

LIMESTONE—Blocks, f.o.b. siding, New York, per cu.ft.:

Rustic buff	$1.42	Selected gray	$1.57
Standard gray	1.47	Selected buff	1.67
Standard	1.57		

SLATE—Roofing, f.o.b., quarry, Bangor, Pa., net, per square:

No. 1 Clear	$9.00@$14.00
No. 1 Ribbon	7.50@ 10.25
Medium Clear	8.00@ 10.50

Road and Paving Materials

PAVING STONE—Carload lots of granite blocks, 4x8x4-in., dressed, f.o.b.:

Atlanta	$3.00 per sq.yd.
Baltimore	3.00 per sq.yd.
Boston	135.00 per M.
Chicago, 5 in	3.25@3.90 per sq.yd.
Cincinnati	110.00 per M.
Cleveland	115@120 per M.
Detroit, 5 in	3.00 per sq.yd.
Kansas City	3.85 per sq.yd.
Minneapolis, 4½x8x5 in	2.80 per sq.yd.
Montreal	104.75 per M.
New Orleans	2.80 per sq.yd.
New York, 5 in., Grade 1, 30 blocks per sq.yd	150.00 per M.
Philadelphia	125.00 per M.
St. Louis, 4x5x8 to 12 in	3.50 per sq. yd.

Current Prices of Construction Materials

Road and Paving Materials—Continued

WOOD-BLOCK PAVING—Prices, f.o.b., in carloads:

	Size of Block	Treatment	Per Sq.Yd.
Atlanta	3½	16	$2.25
Boston	3½	16	2.25
Chicago	3½	12	1.80@2.00
Kansas City	3½	16	2.75
Minneapolis	3½	16	2.50
Montreal	4	16	4.50
New Orleans	3½	16	2.40
New York	3½	16	2.50
St. Louis	3½	16	2.10

FLAGGING—Alongside dock, New York: Manhattan and Bronx, 4 ft. wide, 24c. per sq.ft.; Queens, 5 ft. wide, 26c. per sq.ft.

CURBING—Prices per lin.ft., f.o.b.:
New York: Bluestone, f.o.b. barge, 5x16, in., rough, 90c., per lin.ft., cutting charges extra.
Birmingham: Limestone, 5x18-in., f.o.b., $1.05 per lin.ft.
St. Louis: Class "B" straight, 5x16-in., f.o.b., $1.00 per lin.ft.; roundings, $1.35 per lin.ft.

ASPHALT—Manufacturers' quotations on paving asphalt in carload lots, per ton in packages (350-lb. bbls. or 425-lb. drums); also in tank-car lots, f.o.b. points listed:

	Package	Tank-car or Bulk
Atlanta	$20.40	$17.40
Baltimore	21.75	17.75
Birmingham	27.00	23.00
Boston	23.00	18.00
Chicago	23.50	19.30
Cincinnati	.....	12.30
Cleveland	24.00	20.00
Dallas	20.00	.....
Denver	35.00	.....
Detroit	19.72	14.87
Kansas City	28.00	22.00
Los Angeles (f.o.b. refinery)	18.00	12.00
Maurer, N. J. (Bermudez)	30.00	.....
Maurer, N. J. (Trinidad)	25.00	.....
Minneapolis (f.o.b. Twin Cities)	23.10	18.10
Montreal	28.00	21.50
New Orleans	24.00	21.00
New York (f.o.b. refinery)	16.00	12.00
Philadelphia	17.00	13.00
Pittsburgh	24@26	14@18
St. Louis	22.50	18.50
San Francisco (f.o.b. refinery)	18.00	12.00
Seattle	21.40	18.00

ROAD OILS—Manufacturers' quotations, f.o.b., in tank cars, 8,000 gal. minimum, per gal.:

Birmingham, 40@60% asphalt	$0.0525
Dallas, 40@60% asphalt	.06
New York, 40@60% asphalt	.05
St. Louis, 40@60% asphalt	.04

Iron and Steel

PIG IRON—Producers' quotations, per gross ton, f.o.b.:

Birmingham, No. 2 fdry., silicon, 1.75@2.25	$12.00@$13.00
Pittsburgh, basic	17.00

STRUCTURAL STEEL—Prices on large lots, per 100 lb.:

	Shapes, 3 to 15-In.	Plates, ¼-In.
Birmingham, large mill lots, f.o.b.	$1.75	$1.75
Chicago warehouse, delivered	3.00	3.00
Cleveland, warehouse, delivered	2.95	3.00
Dallas, warehouse, delivered	3.90	4.00
New York, warehouse, delivered	2.50	2.50
Pittsburgh, large mill lots, f.o.b.	1.65	1.65
St. Louis, warehouse, delivered	3.25	3.25
San Francisco, warehouse, delivered	2.90	2.90

BARS, CONCRETE REINFORCING—Prices on large lots of bars rolled from billets, per 100 lb., for ½-in.:

Birmingham, large mill lots, f.o.b.	$1.80
Chicago warehouse, delivered	2.15@3.00
Cleveland, warehouse, delivered	2.25@2.44
Dallas, warehouse, delivered	2.50
New York, warehouse, delivered	2.50
Pittsburgh, large mill lots, stock lengths, f.o.b.	1.75
St. Louis, warehouse, delivered	3.15
San Francisco, warehouse, delivered	2.50

EXPANDED METAL LATH—Per 100 sq.yd., painted, delivered to job, in lots under 200 sq.yds:

Lb. per Sq.Yd.	New York	Birmingham	Chicago	St. Louis	Dallas	San Francisco
2.2	$15.50	$19.50	$10.10*	$19.00	$18.00	$21.50
2.5	16.50	20.50	10.90*	20.00	19.50	22.50
3.0	18.00	22.50	12.25*	21.50	.....	25.00
3.4	19.00	24.00	13.10*	22.50	24.00	27.00

*More than 200 sq.yds.

WIRE REINFORCEMENT FOR CONCRETE—Plain, per 100 sq.ft., 4 in. x 4 in. mesh; manufacturers' quotations are in carloads at mills; dealers' are delivered in lots of 10,000 sq.ft. or over:

Style Number	Weight in Pounds per 100 sq.ft.	Del. From Warehouse: Pittsburgh Mill	Chicago District Mill	New York	St. Louis	Dallas	San Francisco
032	22	$0.94	$0.96	$1.32	$1.30	$1.63	$1.22*
049	28	1.20	1.23	1.67	1.70	2.00	1.55*
068	35	1.47	1.50	2.07	2.10	2.25	1.91*
093	45	1.88	1.93	2.65	2.65	2.86	2.46*
126	57	2.33	2.38	3.28	3.55	3.52	3.03*
153	68	2.78	2.84	3.92	4.25	4.20	.....
180	78	3.19	3.27	4.49	4.65	4.80	.....

* F.o.b.

STEEL SHEETS—Prices per 100 lb. for base sizes:

	Blue Annealed No. 10*	Black No. 24	Galvanized No. 24
Chicago, warehouse, delivered	$3.35	$3.80	$4.35
Cleveland, warehouse, delivered	3.00	3.60	4.20
New York, warehouse, delivered	2.80	3.50	4.00
Pittsburgh, large mill lots, f.o.b.	1.90	2.35@2.45	2.90@3.00
St. Louis, warehouse, delivered	3.45	4.05	4.60
San Francisco, warehouse, delivered	3.65	4.15	4.65

*Light plates.

WIRE ROPE—Discounts from manufacturers' list price on regular grades of bright and galvanized, Eastern Territory, New York, and East of Missouri River.

	Base
Cast steel round strand rope	20%
Galvanized iron rigging and guy rope (add to list)	12½%
Galvanized steel rigging and guy rope	7½%
Plow steel round strand rope	35%
Round strand iron and iron tiller	5%
"Special Steel" and extra strong cast steel, round strand rope	27½%

Discount 5 points less than discount for Eastern territory: California, Oregon, Nevada, Washington, Wyoming, New Mexico, Colorado, North Dakota, Nebraska, Kansas, Oklahoma and Texas. Discount 10 points less than discount for Eastern territory: Arizona, Montana, Idaho and Utah.

RIVETS—Manufacturers' and dealers' quotations on structural rivets, round head, ½-in., full kegs, per 100 lb.:

Chicago, warehouse, delivered	$4.00
Dallas, warehouse, delivered	5.00
Denver, warehouse, delivered	4.65
Denver, warehouse, delivered	4.65
Pittsburgh, large mill lots, f.o.b.	2.75
St. Louis, warehouse, delivered	4.15
San Francisco, warehouse, delivered	5.00
Seattle, warehouse, delivered	5.00

STEEL SHEETPILING—Manufacturers' base price, f.o.b., Pittsburgh, for large mill lots, per 100 lb. $1.90

TERNE PLATE—I C, 8-lb. coating, 20x28-in., f.o.b., Pittsburgh mill:
Per package $10.30

SHIP SPIKES—Per 100 lb., black, from dealers' warehouse stocks; galvanized are about $1.75 per 100 lb. higher:

	½-In.	⅝-In.	¾-In.
San Francisco	$5.50	$5.05	$4.90
Seattle	7.75	5.65	5.50

Pittsburgh mill base in lots of 200 kegs or more, $3.00 per 100 lb.

WIRE NAILS—Per 100 lb. keg, base, delivered from warehouse stocks; also Pittsburgh mill base:

Pittsburgh Mill	Birmingham	Chicago	St. Louis	Dallas	San Francisco	Montreal
$1.95@$2.00	$3.30	$3.30	$2.50	$3.50	$3.25	$4.95

SCRAP—The prices following are, f.o.b., per ton, paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Detroit Per Gross Ton
No. 1 railroad wrought	$8.75	$9.25@$9.75	.....
Stove plate	4.75@5.50	8.00@8.50	$6.00
No. 1 machinery cast	8.00	11.00@11.50	8.00*
Machine shop turnings	3.50	4.50@5.00	4.75
Cast borings	3.50	4.50@5.00	4.25
Railroad malleable	9.00	12.00@12.50	10.00
Re-rolling rails	9.25	11.75@12.25	9.25
Misc. steel rails	.....	10.50@11.00	11.00
Heavy melting steel, No. 1	6.50	10.00@10.25	9.25
Iron and steel pipe	7.25	6.00@6.50	.....

*Net ton.

FREIGHT RATES—The following freight rates per 100 lb., effective May 20, 1930, apply on finished steel products in the Pittsburgh district, including plates, structural shapes, merchant-steel bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc.:

Atlanta	$0.58*	Detroit	$0.265†
Baltimore	.27†	Kansas City	.695†
Birmingham	.58*	New Orleans	.67*
Boston	.40†	New York	.33†
Buffalo	.235†	Pacific Coast (all rail)	1.15‡
Chicago	.34†	Philadelphia	.29†
Cincinnati	.265†	St. Louis	.39†
Cleveland	.185†	St. Paul	.60*
Denver	1.15‡		

*36,000 lb. †40,000 lb. ‡60,000 lb.

Railway Materials and Supplies

STEEL RAILS—Manufacturers' quotations per gross ton, f.o.b., for large mill lots:

	Pittsburgh	Birmingham	Chicago
Standard openhearth rails, 110 lb.	$43.00	$43.00	$43.00
Light rails, 25 to 45 lb.	34.00	30.00	34@36
Re-rolled rails	24@28	28.00	34@36

RAILWAY TIES—For fair-sized orders, f.o.b., the following prices per tie hold:

		6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
New York	Long-leaf sap pine, untreated	$1.00	$1.20
	Creosoted—prices on application.		
Birmingham	White oak, untreated	.80	.90
	Southern pine, creosoted	1.25	1.40
Chicago	White oak, untreated	1.35	1.70
	Oak, empty cell, creosoted	1.75	2.30
	Oak, zinc treated	1.55	2.05
	Southern pine, creosoted	1.45	1.90
St. Louis	White oak, untreated	.95	1.50
	Red oak, creosoted	1.30	1.90
	Sap pine or cypress, untreated	.75	1.25
San Francisco	Douglas fir, green, untreated	.64	.78
	Douglas fir, empty cell, creosoted	1.41	1.90
Montreal	Birch or maple, untreated	.75@1.25	.75@1.25
	Birch or maple, creosoted	1.20@1.30	1.50@1.60

Current Prices of Construction Materials

Railway Supplies—Continued

TRACK SUPPLIES—Manufacturers' and dealers' quotations per 100 lb. f.o.b., Pittsburgh mill, for large mill lots, together with warehouse prices at other places named:

	Pittsburgh	Chicago	Birmingham	St. Louis	San Francisco
Standard spikes, ⅝-in. and larger	$2.80	*$2.80*	$3.75	$3.65@$3.75	$4.10
Track bolts	3.80	*3.80*	.....	4.50@ 5.00	5.10
Standard section angle bars, splice bars or fish plates	2.75	*2.75*	*1.85*	.....	.....
Tie plates	1.95	.....	.....	.....	.....

Pipe

WROUGHT-STEEL PIPE—Discounts from manufacturers' and dealers' standard lists:

	1 to 3-In. Butt Weld		3½ to 6-In. Lap Weld	
	Black	Galvanized	Black	Galvanized
Chicago, warehouse, delivered	57.3%	44.8%	53.9%	41.4%
Cleveland, warehouse, delivered	53.3%	42.3%	50.8%	37.8%
New York, warehouse, delivered	56.14%	43.6%	52.72%	40.18%
Pittsburgh, large mill lots, f.o.b.	64%	52.5%	61%	49.5%
St. Louis, warehouse, delivered	51%	38%	48%	35%

CAST-IRON PIPE—Prices of U. S. Pipe & Foundry Co., per net ton, for bell and spigot pipe, Class B and heavier, f.o.b., on regular lots of pipe:

	4-In.	6-In. and Over
Birmingham mill	$38.00@$39.00	$35.00@$36.00
Burlington (N. J.) mill	*38.00@ 39.00*	*35.00@ 36.00*
Chicago	*46.00@ 47.00*	*41.00@ 44.00*
New York	*41.00*	*38.00*
Pittsburgh	*46.50@ 47.50*	*43.50@ 44.50*
St. Louis	*45.00@ 46.00*	*42.00@ 43.00*
San Francisco	*48.00@ 49.00*	*45.00@ 46.00*

Gas pipe and Class A, $3.00 per ton extra.

SEWER PIPE—Prices delivered, per foot, for standard pipe; 6, 8 and 12-in. are single strength and 18, 24, 30 and 36-in. are double strength:

	6-In.	8-In.	12-In.	18-In.	24-In.	30-In.	36-In
Atlanta	$0.105	$0.175	$0.315	.....	.....	.....	.....
Baltimore	.10	.30	.58	.....	$1.93	.....	$6.50
Birmingham	.17	.28	.50	$0.94	1.79	$3.25	5.85
Boston	.18	.28	.55	1.35	2.38	3.95	5.90
Chicago	.18	.28	.54	1.25	2.25	4.75	6.00
Cincinnati	.135	.21	.405	1.125	2.025	3.672	5.74
Cleveland	.189	.294	.567	1.35	2.43	4.824	7.38
Dallas	.23	.325	.586	1.106	1.95	3.68	5.00
Denver	.161	.23	.414	.816	1.44	.....	.....
Detroit	.18	.28	.6075	1.50	2.70	5.12	.....
Kansas City	.21	.335	.52	1.22	1.90	3.60	.....
Los Angeles	.21	.29	.52	1.186	2.03	3.39	5.09
Minneapolis	.155	.24	.50	1.15	1.85	3.45	4.60
Montreal	.36	.53	.78	1.48	2.75	4.20	.....
New Orleans	.18	.30	.54	1.02	1.95	.....	.....
New York	.17	.265	.52	1.30	2.34	4.47	6.86
Philadelphia	*.0945*	*.14*	*.297*	*.80*	*1.44*	*2.30½*	*3.38*
Pittsburgh	**.1575**	**.245**	**.54**	**1.25**	**2.25**	**4.68**	**7.17**
St. Louis	.1645	.26	.468	1.092	1.872	3.65	4.80
San Francisco	**.21**	**.30**	**.54**	**1.26**	**2.16**	**3.60**	**5.40**
Seattle	.22	.30	.54	1.26	2.16	3.50	5.50

CLAY DRAIN TILE—Prices delivered by dealers, per 1,000 lin.ft.:

Size, In.	New York	Birm'ham	St. Louis	Dallas	San Fran.	Seattle
4	$45.00*	$56.00	$50.00	$90.00	$67.50	$60.00
6	80.00*	112.00	85.00	.....	112.50	112.00

*F.o.b.

Miscellaneous

LINSEED OIL—Raw oil, f.o.b., in 1- to 4-bbl. lots, per lb.:
New York.... *$0.098* Chicago..... **$0.105** Minneapolis...**$0.107**

WHITE AND RED LEAD—Base price per 100-lb. keg, f.o.b., New York: White, dry, $13.25; White in oil, $13.25; Red, dry, $13.25; Red, in oil, $14.75.

CHEMICALS—Water, sewage treatment, road work, round lots in the New York market:

Sulphate of aluminum, in bags, per 100 lb	*$1.25@$1.40*
Sulphate of copper, in bbl., per 100 lb	**4.25@ 4.50**
Soda ash, 58%, in bags, per 100 lb	*1.15@1.17½*
Chlorine, cylinders, per lb	*.04@ .06*
Bleaching powder, in drums, f.o.b. works, per 100 lb	*2.00@ 2.10*
Calcium chloride, flaked, in drums, f.o.b. works, per ton	22.75

MANILA ROPE—The number of feet per pound for the various sizes is as follows: 6-in., 7-ft., 6-in.; ¾-in., 6-ft., 1-in.; ¼-in., 4-ft., 5-in.; 1-in., 3-ft., 8-in.; 1¼-in., 2-ft., 5-in.; 1½-in., 1-ft., 8-in. Following prices are quoted by dealers per pound for ¼-in. and larger:

Atlanta	$0.19	Kansas City	$0.25
Baltimore	.225	Los Angeles	.25
Birmingham	**.28**	Minneapolis	.19
Boston	.20	Montreal	.185
Chicago	.17	New Orleans	.25
Cincinnati	.21	New York	.19
Cleveland	.21	Philadelphia	.21
Dallas	.26	San Francisco	.175
Denver	.20	Seattle	.195
Detroit	.22	St. Louis	.175@.18

BUILDING PAPER—Black, 50-lb. per roll of 500 sq.ft., in carloads, f.o.b., producing point $2.16

SLATERS FELT—In carloads, per roll, f.o.b., producing point $0.79

ROOFING MATERIALS—Prices, f.o.b. New York, delivered by dealers to contractors, in carloads:

Asphalt felt, per 100 lb	$3.00
Tar felt, per 100 lb	3.00
Asphalt coating, per gal	.34
Tar pitch, in 350 lb. barrels, per ton	28.00

PREPARED ROOFINGS—Prices, delivered by dealers to contractors, in carloads, f.o.b. New York, per square:

Single shingles, slate finish, sufficient to cover 100 sq.ft.	$6
Strip shingles, 4 in 1, hexagonal shape, with Underwriters' label	6
Slate surfaced roofing in rolls weighing 85 to 90 lbs.	2

WINDOW GLASS—United inches 25, bracket sizes 6x8 to 10x15, single double thickness, discount from jobbers' box list at New York warehouses:
AA..... 83% A..... 89% B..... 91

EXPLOSIVES—Manufacturers' quotations per pound for dynamite delivered small lots—under 200 lb.:

	Gelatin 40%	Gelatin 60%		Gelatin 40%	Gelatin 60%
Atlanta	$0.22	$0.245	Los Angeles, f.o.b.†	$0.1875	$0.2225
Baltimore	.215	.2375	Minneapolis	.20	.225
Birmingham	.22	.245	Montreal	.20	.24
Boston	.225	.25	New Orleans	.195	.22
Chicago	.195*	.22*	New York	.25‡	.2725
Cincinnati	.22	.245	Philadelphia	.215	.24
Dallas	.2125	.2475	St. Louis	.215	.235
Denver, f.o.b.	.19	.2125	San Francisco	.155	.18
Kansas City, Mo.	.2025	.2225	Seattle	.1525	.175

*Quantities above 500 lb. but less than a ton. †San Fernando Arsenal. ‡Special gelatin in case lots.

Lumber

Prices Are Per Thousand Feet, Board Measure

New York—Timbers, No. 1 Common, rough, delivered to contractor at site of job, in Manhattan, in 20 ft. lengths and under, per M. ft., b.m.:

	Long-leaf Yellow Pine	Douglas Fir
3x4 to 8x8	$50.00	$32.00
3x10 to 10x10	*60.00*	*35.00*
3x12 to 12x12	*65.00*	*35.00*
3x14 to 14x14	*75.00*	*37.50*

Chicago—Prices, f.o.b., in carloads, No. 1 Common, rough, per M. ft. b.m. For delivery to job from stock, in truckloads, add $10 per M. ft., b.m.:

	20 Ft. and Under Long-Leaf Yellow Pine	Up to 32 Ft Douglas Fir
3x4 to 8x8	$39.50	$37.50
3x10 to 10x10	47.00	37.50
3x12 to 12x12	58.00	37.50
3x14 to 14x14	71.00	38.50

San Francisco—Douglas fir, No. 1 Common, rough, at yards. For delivery to contractor at site of job, add $5 per M. ft., b.m.:

	10-16-18 and 20 Ft.	22 and 24 Ft.
3x3 and 4	$30.00	$32.00
3x6 and 8	30.00	32.00
3x10 and 12	30.00	32.00
3x14	33.00	34.00

Other Cities—Delivered by dealers, No. 1 Common, rough, per M. ft., b.m.:

	8x8-In. x 20 Ft. and Under				3x12 to 12x12-In. 20 Ft. and Under	
	Pine	Fir	Hem-lock	Spruce	Pine	Fir
Atlanta	$50.00	.....	.....	.....	$65.00	.....
Baltimore	36.00	$50.00	$53.50	$61.75	75.00	$50.25
Birmingham	53.00	.....	.....	.....	56.50	.....
Boston	51.00	45.00	47.00	48.50	57.00	42.00
Cincinnati	42.50	55.00	.....	.....	52.50	52.50
Cleveland	54.00	58.00	.....	.....	58.00	62.00
Dallas	55.00	57.50	55.00	55.00	55.00	50.00
Denver	.....	50.00	50.00	50.00	.....	47.00@55.00
Detroit	53.00	51.00	.....	.....	67.00	51.00
Kansas City	36.00	38.50	38.50	.....	59.00	40.00
Los Angeles	.....	43.50	.....	.....	.....	45.50
Minneapolis	.....	46.25	.....	.....	.....	46.25@47.75
Montreal	50.00	48.00	.....	.....	56.00	48.00
New Orleans	44.00	40.00	.....	45.00	65.00	60.00
Philadelphia	*48.00*	42.00	41.00	46.00	58.00	*42.00*
Pittsburgh	53.00	57.00	65.00	66.00	53@65	60@62
St. Louis	*52.00*	*40.00*	*40.00*	.....	59.50	**41.00**
Seattle	.....	18.00	.....	.....	.....	18.00@20.00

	3x10 In. x 16 Ft. and Under			2x10 In. x 16 Ft. T. & Gr.	
	Pine	Fir	Hem-lock	Pine	Fir
Atlanta	$55.00	.....	.....	$40.00	.....
Baltimore	55.00	**$45.00**	$44.00	.....	.....
Birmingham	36.00	.....	.....	45.00	.....
Boston	46.00	40.00	42.00	47.50	$44.00
Cincinnati	45.00	47.50	.....	35.00	45.00
Cleveland	65.00	65.00	.....	42.00	54.00
Dallas	60.00	.....	.....	55.00	.....
Denver	40.50	38.00	38.50	.....	44.00
Detroit	47.00	44.00	.....	*45.50*	*44.50*
Kansas City	45.00	37.50	36.50	33.25	.....
Los Angeles	40.50	40.50	.....	.....	48.50
Minneapolis	65.00*	40.00	.....	45.00*	39.00
Montreal	56.00	.....	.....	.....	.....
New Orleans	40.00	40.00	.....	54.00	48.00
Philadelphia	*50.00*	42.00	40.00	53.00	42.00
Pittsburgh	43.00	50.00	55.00	40.00	50.00
St. Louis	42.00	*41.00*	*41.00*	46.00	43.00
Seattle	.....	15.00	.....	.....	14.50

*Northern Pine, No. 2 Com.

PILES—Prices of Nichols Bros., 90 West St., N.Y.C., per lineal foot, pine, with bark on, f.o.b., New York, delivered from barge, 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.12	$0.165
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.165	.215
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.19	.235
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.225	.345
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.2425	.295
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.305	.395
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.345	.435

CONSTRUCTION NEWS

CONTENTS

Engineering Structures:	Page
Airports	142
Bond Elections	141
Bridges	137
Dams	142
Equipment	143
Excavation	141
Federal Government	141
Foreign	144
Grade Crossings	142
Grain Elevators	142
Heating and Ventilating	143
Materials	143
Parks and Sports	142
Piers and Wharves	142
Power and Lighting	142
Railways	142
Sewers	136
Streets and Roads	137
Subways and Tunnels	142
Waste Disposal	136
Waterworks	135
Unclassified	143
Industrial Buildings	
Factories and Mills	146
Garages	147
Power Plants	147
Shops and Foundries	147
Warehouses	147
Commercial Buildings	
Banks	146
Churches	144
Clubs	144
Hospitals	144
Lofts	146
Offices	146
Public	146
Residential	144
Schools	145
Stores	146
Theatres	145
Unclassified	146

Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue.

Location	Project	Cost	Status
Bridges			
Los Angeles	Viaduct		Bids asked
Subways			
Philadelphia	Subway	$1,578,145	Contract
Federal Government			
Stapleton, (N. Y.)	Marine Hospital	$2,500,000	Proposed
Louisville	Post Office	2,000,000	Bids asked
Boston	Post Office	4,648,000	Contract
Unclassified			
Texas	Oil pipe line	1,000,000	Proposed
Factories and Mills			
St. Louis	Publishing plant	1,500,000	Proposed
Buildings			
Toledo	Club	1,000,000	Bids asked
Elmhurst (N. Y.)	Hospital	2,500,000	Proposed
Pittsburgh	Hospital	1,300,000	Proposed
Pittsburgh	Hospital	2,000,000	Bids asked
Pittsburgh	Hospital	1,000,000	Bids asked
Worcester	Court House	1,000,000	Proposed
Bismarck (N. D.)	Capitol	2,000,000	Proposed
Berkeley (Calif.)	University building	1,000,000	Proposed
Hamilton (Ont.)	Station	1,500,000	Proposed

WATERWORKS

PROPOSED WORK

Calif., Laguna Beach—For 300,000-500,000 gal. rein.-con. storage reservoir.

Calif., San Francisco—Bd. Supervs. 46.5 mi. pipe line across San Joaquin Valley to afford emergency supply in connection with Hetch Hetchy Project to serve until completion of Coast Range Tunnels. $7,500,000 exclusive of $250,000 for Red Mountain Bar Siphon. M. M. O'Shaughnessy, city engr. Noted Feb. 5.

Ill., Quincy—City Council authorized Waterworks Comn. to expend $90,000 filtration plant extensions, water softening equipment. C. F. Hoover, consult. chemist on water softening. W. R. Gelston, supt. Mead & Seastone, Madison, Wis., consult. engrs.

Kan., Collyer—Waterworks. $25,000.

La., Spring Hill—City Council waterworks. E. T. Archer & Co., 609 New England Bldg., Kansas City, Mo., engrs.

Mass., Andover—Town. Bd. P. Wks., M. Gilliard, constructing waterworks. $20,000; extensions, $15,000. C. J. Bailey, chn. Finance Com.

Mass., Arlington—Town. Bd. Selectmen, improving, extending waterworks. $55,825 appropriated.

Mass., Braintree—Town. Bd. Selectmen, extensions, laying and relaying mains. $75,465 appropriated.

Mass., Burlington—Town. A. Busted, new water supply. $175,000. Whitman & Howard, 89 Broad St., Boston engrs. Noted Feb. 19.

Mass., Framingham — Town. Bd. Selectmen, water improvements, maintenance. $90,000 appropriated.

Mass., Lexington—Town. Bd. Selectmen, plans waterworks extensions, improvements, maintenance. $72,000 appropriated.

Mass., Medford (br. Boston)—City Water and Sewer Comrs., new 6- to 16-in. mains. $65,000.

Mass., Milton (br. Boston)—Town. Bd. Selectmen, mains in various streets. To exceed $15,000.

Mass., Norwood—Town. Bd. Selectmen, improvements, extensions to waterworks. $69,900 appropriated.

Mass., Sharon—Town. Bd. Selectmen, extending waterworks. $20,000.

Mass., Stoneham—Town. Bd. Selectmen, extending waterworks, resurfacing. $18,600 appropriated.

Mass., Walpole—Town, erecting water standpipe. $20,000. A. F. Hart, Town Hall, town engr. Noted Mar. 26.

Mass., Woburn—City. P. Wks. Dpt., addition to water supply, incl. new wells, piping, pumps. $110,000.

Minn., Cloquet—City, 2 reservoirs. $15,000. C. Foster, Sellwood Bldg., Duluth, engr.

Mo., St. Louis—City Water Dpt. installing water meters in various commercial buildings. $25,000. L. Day, comr.

N. H., Keene—City, 650-ft. dam, 30 ft. high, at Roaring Brook. $50,000. P. P. Brabbidge, water supt.

N. Y., New York—Dpt. Water Supply, Gas & Electricity, Municipal Bldg., filter beds, Springfield, to exceed $20,000; and at Sutphin Blvd., South Jamaica, to exceed $20,000.

O., Wellsville—Bd. Control, new waterworks plant. $50,000. W. H. Dittoe, Youngstown, engr.

Tex., Galveston—City, c/o O. E. Casey, comr. Waterworks, 1 mi. 6 in. water pipe line to serve municipal airport and recreation park, probably will purchase 6 in. c.i. screw joint pipe.

Tex., Temple—City, c/o W. W. Sellers, 250,000 gal. elevated reservoir, and 3 m.g. concrete raw water reservoir. $65,000.

Ont., Merritton—Council 36 in. c.i. mains, concrete conduits. $300,000. A. Fairburn, chn. com.

Ont., Port Credit—Toronto Twp. 5 mi. 6 in. and up c.i. mains, booster pumping station, in Cooksville-Center Rd. Dist. $70,000. Gore, Nasmith & Storrie, Confederation Life Bldg., Toronto, engrs.

Ont., Toronto—City 12 in. and up extensions to high pressure mains, with valves; hydrants, in area south of Queen St. between Church and Sherbourne Sts. $211,000. R. C. Harris, City Hall, engr.

Que., Hull—E. B. Eddy Co. Ltd., Hull, and 360 St. James St., Montreal, soon takes bids water filter equipment.

BIDS ASKED

Calif., Laguna Beach—Apr. 7, by Laguna Beach County Water Dist., furnishing centrifugal pump 600 g.p.m. operating against 340 ft. head.

Calif., San Francisco—Apr. 15, by S. J. Hester, secy. Bd. P. Wks., City Hall, fabrication and welded steel pipe (University Mound Pile Line in connection Municipal Water System), Sect. 1, 11,500 ft. 48 in inside diam. pipe, ¼ in. plate, 400 ft. 48 in. inside diam. pipe, ⅜ in. plate and 1,500 ft. 36 in inside diam. pipe, ¼ in. plate, $93,000. Bids later on Sect. 2, $110,000.

Ill., Millstadt—City Council bids about May 1, system of 4, 6 and 8 in. mains, tank on tower, deep wells, deep well pump, high service pressure pumps, surface reservoir, $47,000. Russell & Axon, 408 McDaniel Bldg., Springfield, and 6200 Eastern Ave., St. Louis, Mo., and 408 McDaniel Bldg., Springfield, Mo., engrs.

Mass., Natick—See "Contracts Awarded."

Mass., Newton — Apr. 16, by Metropolitan Dist. Comn., Water Div., 6,400 lin.ft. 60 in. steel water pipe, appurtenances. To exceed $15,000.

Mass., Pembroke — Apr. 10, by Bd. Water Comrs. at office of Fay, Spofford & Thorndike, engrs., 44 School St., Boston, laying 70,700 lin.ft. 6- to 10-in. bell and spigot pipe, 350 lin.ft. 8- to 10-in. flexible joint pipe, 162 6- to 8-in. gate valves, 80 fire hydrants, constructing elevated tank for waterworks. To exceed $15,000.

Mich., Detroit—Apr. 21, by Bd. Water Comrs., electric power service systems for pumping and power plants, Springwells Station. Contr. PC-79. G. H. Fenkell, genl. mgr. and ch. engr.; adv. E. N.-R. Apr. 2.

Mich., Plymouth—Apr. 6, by Detroit House of Correction Comn., 1441 Alfred St., Detroit, erecting 300,000 gal. elevated steel water tank, with pumping equipment pipes, valves motors etc., for waterworks for prison farm. $20,000. Warner & Warner, 2231 Park Ave., Detroit, engrs.

Mich., Ypsilanti—Apr. 7, by G. R. Thompson, budget dir., waterworks, incl. 7,500 lin.ft. 6 in. c.i. pipe, 3 pump houses, valves, connections, appurtenances, for Ypsilanti State Hospital. $20,000. E. D. Rich, dir. Michigan Dpt. Health, Lansing.

Minn., Minneapolis—Apr. 7, by F. S. Gram, city purch. agt., chlorine handling equipment, incl. motors, cranes, automatic scales for filtration dpt. Former bids rejected. N. W. Elsberg, city engr. Noted Mar. 13 daily.

Mo., St. Louis—Apr. 28, by Bd. P. Serv., 208 City Hall, 5 in. rein.-con. covering on two water storage reservoirs, on Compton Hill, Grand Blvd. between Russell Blvd. and Lafayette Ave. $315,000. L. Day, City Hall, water comr. Noted Jan. 22.

Mont., Forsyth—Bids about Apr. 6, pumping and filtration plant. $50,000. F. F. Palmer, city engr. Noted Mar. 25.

N. J., Jersey City—Apr. 7, by Bd. City Comrs., City Hall, c.i. pipe, special and standard castings, to Bureau Water. $5,000. J. Henderson, city engr.

N. Y., Brooklyn—Apr. 7, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, constructing access chambers around expansion joints on existing steel watermains in various streets.

N. Y., Goshen—Bids about July 1, general contract enlarging water supply. H. B. Cleveland, 255 Bway., New York, engr. Noted Feb. 26.

N. Y., New York—Apr. 7, by J. J. Dietz comr. Water Supply, Gas & Electricity, Municipal Bldg., core borings adjacent to Boyds Corners Dam, Putnam Co.

N. Y., New York—Apr. 21, by Bd. Water Supply, test borings in Colchester and Hancock, Delaware Co., Contr. 309. G. J. Gillespie, pres.; adv. E. N.-R. Apr. 2.

O., Massillon—Ohio Water Serv. Co., bids about May 13, extending mains in 27 streets, total of 48,000 ft. watermains. $100,000.

Wash., Aberdeen—Apr. 15, by City Comrs., 4 mi. wood or c.i. pipe on Wishkah gravity water system. C. S. Watkins, Aberdeen, water supt. Noted Jan. 15.

W. Va., Pennsboro—Apr. 14, by Mayor and Council, I. V. Taylor, city clk., furnishing materials, constructing 2 steel reservoirs, 15,000 ft. distribution lines, hydrants, valves, meters. J. P. Blundon, Law Bldg., Keyser, consult. engr. Noted Sept. 4.

CONTRACTS AWARDED

Calif., Sacramento—H. G. Denton, city clk., to Sacramento Pipe Wks., 16th and North B Sts., one hundred and twenty 4 in. gate valves at $8.65; fifty 6 in. $15.25. Noted Dec. 18.

See proposal advertising on page 106

Constr. News page 135

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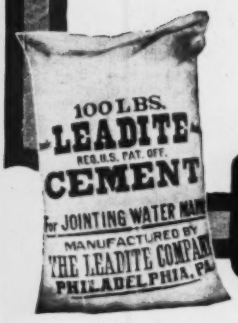


No Caulking

Waterworks (Continued)

Calif., Vallejo—City Council, 4,416 ft. 24 in. bell and spigot pipe, 16 ft. lengths, to American Cast Iron Pipe Co., Balboa Bldg., San Francisco, $17,491. Noted Jan. 8.

Ill., Park Ridge—Village, 24 in. c.i. mains, to N. Santucci, Niles Center, $24,231. Noted Mar. 19.

Ind., Ft. Wayne—Bd. P. Wks., City Hall, feeder main from reservoir, to John Dehner, Inc., 401 South Clinton St., est. $57,000; large storage tank, to Buesching-Hagerman & Co., 402 East Superior St., $355,377. Est. $443,000. Noted Feb. 19.

Mass., Chicopee—City, Engineering Dpt., City Hall, elevated steel tank, to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., $4,950.

Mass., Natick—Town, Bd. Selectmen, mains in Worcester St., day labor. $15,000.

Mass., Yarmouth—Town, Water Comn., J. E. Howes, water pipe for pipe line, to U. S. Pipe & Fdry. Co., Morris Bldg., Phila., Pa., $17,500; constructing pipe line, to F. W. Carlson, Bridgewater, $11,400. Noted Mar. 5.

Mich., Detroit—Bd. Water Comrs., D. C. Grobbel, acting secy., electric power service system, for screen chamber, Detroit water supply, to Miller-York, Inc., 1523 East Congress St., $9,480; furnishing by-pass gates, stands for junction works, Forest and Pennsylvania Aves., to J. J. Gorzick, 400 Penobscot Bldg., $5,610; three 48 in. D.W.S. gates, to Michigan Valve & Fdry. Co., Clayton and Parkinson Aves., $7,485. Grand total $22,575.

Pa., Pittsburgh—R. G. Woodside, controller Allegheny Co., 3,000 lin.ft. 6 in. plain end wrought steel gas line, 7,200 lin.ft. 8 in. bell and spigot c.i. water pipe, 600 lin.ft. 6 in. corrugated metal pipe culvert, at Municipal Airport, Mifflin Twp., to R. H. Cunningham, 619 Pennsylvania Ave., Turtle Creek, $16,620. Noted Mar. 5.

Tex., Fort Worth—City, c/o O. E. Carr, mgr., 1 story, brick filtration plant addition, incl. 55 x 69 ft. administration building, 138 x 310 ft. new sedimentation basin, 39 x 107 ft. filter building, 55 x 69 ft. chemical building, wash water tank, and steel, brick covered tank, etc., to F. Parrott & R. F. Ball Constr. Co., 1st Natl. Bank Bldg., Dallas, and Fort Worth. $394,937. Est. $450,000. Noted Feb. 12.

Tex., Linden—City, c/o Secretary, waterworks and sewerage systems, to Harper Constr. Co., Dallas. Est. $65,000.

Tex., Toyah—Texas & Pacific Ry. Co., E. F. Mitchell, ch. engr., Dallas, earthen dam across Big Aguaja to provide reservoir for water supply, involving 60,000 cu.yd. earth embankment, 12,000 cu.yd. solid rock spillway excav., to Allhands & Davis, Frisco Bldg., Joplin, Mo., $70,000.

Wash., Bellingham—For 40,900 lin.ft. 4- to 24-in. c.i. pipe for water improvements, to U. S. Pipe Co., Colman Bldg., Seattle, $24,322. Noted Feb. 26.

Wash., Yakima—Bd. P. Wks., rehabilitating water system, to Amer. Cast Iron Pipe Co., Birmingham, Ala., $19,242.

Wyo., Evanston—City Comn., 1 m.g. reservoir, to V. C. Talboe, Provo, Utah, $17,462. Est. $30,000.

B. C., Vancouver—City Council, furnishing 47,292 ft. 4, 6 and 8 in. Class C and 9,938 ft. 4 in. Class D, c.i. pipe; also 5,000 ft. 12 in Class C, Delavaud c.i. pipe, for waterworks, to Evans Colemans & Evans, Ltd., foot of Columbia Ave., $34,731 and $10,675 respectively—5,000 ft. 12 in. steel pipe, to Leith Murray & Co. Ltd., 510 Hastings St. W., $8,700—15,000 ft. 12 in. c.i. pipe, to Gordon & Belyea Ltd., 101 Powell St., $31,707. Grand total $85,813. Noted Jan. 22.

Ont., Hamilton—W. L. McFaul, city engr., filter building and coagulation basin in connection with filtration plant, to W. H. Yates Constr. Co., 17 Main St. E., $337,000. Noted Sept. 25.

SEWERS

PROPOSED WORK

Ark., Blytheville—City Council sewerage system, incl. mains, laterals, pumps, disposal plant in Sewer Impvt. Dist. 3. $70,000. E. J. Heaton, Blytheville, engr.

Ark., Hot Springs—Preliminary plans sewage disposal plant, may divert outlet now running into Lake Hamilton so all sewage will empty into Lake Carthage. $400,000. A. F. Annen, City Hall, engr.

Calif., Los Angeles—Los Angeles Co., 25,000 lin.ft. 8- to 15-in. vitr. sewer, 4,000 ft. c.i. force main, pumping plant with 4 pumps in district near Artesia (County Impvt. 962) $100,000. County Sewer Dpt. W. K. Foster, ch. engr., Klinker Bldg., engrs.

Calif., Soledad—City Council 7,070 ft. 10-in. and 10,536 ft. 6 in. vitr. sewer, sewage treatment plant. C. C. Kennedy, Call Bldg., San Francisco, engr. Noted Aug. 7.

Colo., Cheyenne Wells—City Council preliminary surveys sewerage system. A. A. Weiland Eng. Co., 1st. Natl. Bank Bldg., Pueblo, consult. engr.

Conn., Farmington—Town, preliminary surveys, sewage disposal plant. $25,000 or more. Henry Robinson Buck, Inc., 650 Main St., Hartford, engrs.

Conn., Hartford—State sewerage system, incl. filter beds at Cedarcrest Sanatorium. $60,000. J. F. Lynch, 578 Campbell Ave., West Haven, state engr. for section. Henry Robinson Buck, Inc., engrs., 650 Main St., preparing plans for sewerage system. Noted Feb. 19.

Ill., Chicago—J. J. Sullivan, clk. Sanitary Dist., of Chicago, 910 South Michigan Ave., soon takes new bids California Avenue Outfall Sewer, Contr. 1, incl. 4,062 lin.ft. 4 ft. 6 in. rein.-con. precast pipe. Former bids rejected. Noted Mar. 5.

Ind., Franklin—City Council surveys sewage disposal system. $50,000. Noted Dec. 4.

Ind., Michigan—Bd. P. Wks. Franklin St. Sewer. $65,000. A. Peterson, Michigan City, engr.

Ia., Sibley—Sewage disposal plant, auxiliary piping. W. E. Buell & Co., 501 Insurance Exch. Bldg., Sioux City, engrs.

Mass., Arlington—Town, Bd. Selectmen, sewerage works. $86,000 appropriated.

Mass., Canton—Town, Sewer Comn., soon takes bids sewerage works. $50,000. Whitman & Howard, 89 Broad St., Boston, engrs. Noted Mar. 12.

Mass., Falmouth—Town, sewage disposal plant for Woods Hole Sect. To exceed $150,000. F. A. Babour, 1119 Tremont Bldg., Boston, engr.

Mass., Quincy—City Dpt. P. Wks., extending sewerage system. $70,000.

Mass., Watertown — Town, Bd. Selectmen, sewers, $39,300 appropriated; also concrete sidewalks throughout town, $60,000 appropriated.

Minn., Excelsior—Village, sewage disposal system. $80,000. Druar & Milinowski, 904 Globe Bldg., St. Paul, engrs.

N. J., Fairview—Bd. Boro Council, Tiger Hose Fire House, repairing present sewage disposal plant or erecting new one. $25,000. F. Oleri, 650 Bergenline Ave., West New York, boro engr.

N. Y., New York — Sanitary Comn., W. Schroeder, Jr., municipal Bldg., piping, storage tanks, fuel oil pumps and housing in connection with Wards Island Sewage Treatment Works. $25,000 or more. Sloan & Robertson, 420 Lexington Ave., archts. Noted Jan. 15.

O., East Palestine—City secondary treatment unit with single clarifier at sewage disposal plant. $26,500. F. S. Barkhoff, Salem, engr.

Ont., Chatham—City, T. M. Kingston, engr., City Hall, 8 in. and up vitr. tile storm and sanitary sewers in sewers area south of the Canadian Natl. Ry. and east of LaCroix St. with outlet to the Thames River or Robertson St. Est. $50,000.

BIDS ASKED

Calif., Carpinteria—Apr. 8, by Trustees Carpinteria Sanitary Dist. 5 mi. 6- to 12- in vitr. sewers, 2.5 mi. house connections. Noted Nov. 27.

Calif., La Mesa—Apr. 14, by City Council, O. E. Lapum, clk., sewage chlorinator and platform scale, capacity at rate 100,000 gal. flow per 24 hr. (solution and dry feed types.)

Md. Baltimore—Apr. 8, by Bd. Awards, sanitary sewers, appurtenances, comprising triple conduit inverted syphon. Sanitary Contr. 279. M. J. Ruark, Municipal Bldg., sewerage engr.

Mass., Marblehead—See "Contracts Awarded."

Mass., Springfield—See "Contracts Awarded."

N. Y., Brooklyn—Apr. 8, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, storm water and sanitary sewers in Avenues R. S. and T. Kenmore, Elmore and Mansfield Pls., East 26th and East 27th Sts.; also sanitary sewer in Ocean Ave.

N. Y., Napanoch—Apr. 21, by Dpt. Correction, State Office Bldg., Albany, sewage disposal system, at Institution for Defective Delinquents. W. N. Thayer, Jr., comr.; adv. E. N.-R. Apr. 2. Noted Mar. 20.

Mo., St. Louis—Apr. 21, by Bd. P. Serv., City Hall, 3,300 lin.ft. 5 to 7 ft. concrete horsehoe section sewer in tunnel for Sect. B-3, Western Mill Creek Pub. Relief Sewer. $141,680. W. W. Horner, city engr.

Pa., Coatesville—Activated 1 sludge treatment plant, intercepting sewers. $250,000. Remington, Vosbury & Goff, 509 Cooper St., Camden, N. J., engrs.

Pa., Duquesne—See "Streets and Roads."

Pa., Forest Hills—Apr. 8, by Boro, E. S. Smull, clk., Boro Bldg., 3 mi. 8 or 10 in. terra cotta pipe, manholes, inlets, headwalls part of Dists. 2 and 3, Bryn Mawr. A. Hutchinson, 608 South Ave., Wilkinsburg, engr.

Pa., Sharon—Apr. 7, by F. S. Williams, city clk., 3,320 ft. 8 in. terra cotta sewers in Taylor, Spencer and Service Aves. L. E. Burnside, City Bldg., engr.

Tex., Houston—Apr. 8, by City, c/o W. E. Monteith, mayor, storm sewers in Sect. 1, North Main Storm Sewerage System, extending along White Oak Gulley from Vincent and Fuller Sts. to Winston, North Main Sts., incl. 280 ft. Class A, 18 in. c.i. pipe, 3,900 ft. 36 to 120 in. monolithic pipe; 811 ft. 36 and 120 in. rein.-con. pipe; 935 ft. 120 in. Type C, rein.-con. pipe, 15,000 lb. reinforcing steel. J. M. Nagle, Houston, engr.

Tex., Waco — City, c/o E. E. McAdams, mayor, taking bids 24- to 42-in. storm sewers. $40,000. Noted Feb. 5.

Wash., Seattle—Apr. 7, by Bd. P. Wks., Charleston Street Unit of Lake Washington Intercepting Sewerage System, incl. 20,000 ft. 8- to 24-in. vitr. clay pipe, 3 pumping stations. $190,000. R. H. Thomson, city engr.

Wis., Milwaukee—Apr. 10, by Sewerage Comn., three 1,600 gal. centrifugal water pumps with motors, control, panels, exciters, appurtenances. J. L. Ferebee, ch. engr.

CONTRACTS AWARDED

Calif., Los Angeles—Bd. P. Wks., City Hall, by-pass channel, incl. 580.97 lin.ft. pre-cast rein.-con. pipe, appurtenant work, Hyperion Sewage Treatment Plant, to M. Brkich, California Reserve Bldg., $18,750.

Ia., Bloomfield—W. J. Brown, city clk., sewage treatment plant, to W. Nosser, Iowa City, $27,000; sewers, to Dobson & Humphreys, 4920 Leavenworth Ave., Omaha, Neb., $13,000. Est. $45,000. Noted Feb. 5.

Ky., Ft. Thomas—City Council, sewage disposal plant, Imhoff tanks, circular filter, humus tank, sludge beds, 276 ft. 4.8 and 12 in. vitr. clay and 350 ft. 6.8 and 12 in. c.i. pipe, to W. L. Hailey Co., 314 4th Ave., Nashville, Tenn., $23,700. Est. $28,000. Noted Feb. 19.

Md., Baltimore—Bd. Awards, sanitary sewers listed in Contr. 274, to Dante Contg. Co., 319 South Eden St., $54,634. Noted Mar. 5.

Mass., Boston—Metropolitan Dist. Comn., constructing 3,580 ft. Sect. 119, New Neponset Valley Sewer, South Metropolitan System in Canton, to F. W. Christy, 303 Chapman St., Providence, R. I., $42,112; 5,735 ft. Sect. 117, New Neponset Valley Sewer, South Metropolitan System in Norwood, to J. F. Fitzgerald Constr. Co., 38 Chauncy St., $96,062. Noted Mar. 12.

Mass., Braintree—Town, P. Marshall, sewer comn., sewerage system, Sect. 5, to Zoppo & Civitarese, 480 Metropolitan Ave., Hyde Park, $107,707; Sect. 6, to A. C. Trojano, 81 Shaw St., $79,689.

Mass., Marblehead—Town, extending sewers from trunk lines along Lee and South Sts., day labor. $25,000 or more.

Mass., Springfield—Sewerage works, day labor. $25,000. R. P. Marsh, city engr.

Mich., Muskegon Heights—Sewage treatment plant, to Kreuger & Hansen, Muskegon Heights, $102,475. Noted Feb. 12.

Mo., St. Louis—Bd. P. Serv., City Hall, 2,080 ft. Sect. B, Blendon Place Pub. Relief Sewer and reconstructing Arsenal Street Sewer Outlet, to Riley Contg. Co., 110 North 7th St., $68,426 and $8,113 respectively. Noted Feb. 19.

N. M., Farmington—City Council, sanitary sewerage system, disposal plant, to Orman Constr. Co., 435 East 1st St., Pueblo, Colo., $53,000. Noted Dec. 4.

Tex., Galveston—City, c/o F. A. Quin, aud., 58,850 ft. 8- to 12-in. sanitary sewers and 155 manhole covers in West End, south of Avenue J and west on 47th St. and north of Avenue J, between 38th and 46th Sts., to H. J. Hetkes, Houston, $64,967. Noted Mar. 5.

Tex., Liberty—City, c/o Secretary, new sewerage system, to E. L. Dalton, Dallas. Est. $60,000.

Tex., Linden—See "Waterworks."

Utah, Brigham City—Town, 6- to 12-in. sanitary sewerage system in business section, to Wheelwright Constr. Co., Ogden, $27,193. Est. $33,000. Noted Feb. 5.

Wis., Milwaukee—City, to Wenzel & Henoch Co., 5025 State St., sewers in West Center St. $698, West Lincoln Ave. $2,020, West State St. $1,611, East Kenwood Blvd. $667, East Keefe Ave. $1,719, West Forest Home St. $748; to Wisconsin Sewer & Constr Co., 946 30th Ave., North 12th St. $1,612, West St. Paul Ave. $1,347; to T. G. Holton, 811 South 32nd St., North 80th St. $5,199; to Ribbens Bros., 1982 Woodburn Ave., North 70th St. $4,956, North 77th St. $9,408; West Lorraine Pl. $1,411; to Teget Constr. Co., 3535 Villard Ave., West Roosevelt Dr., $2,868. Grand total $34,264.

Ont., Hanover — Town, rein-con. activated sludge sewage disposal plant, to W. E. Taylor, 22 Falcon St., Toronto. Est. $30,000. Noted Feb. 5.

Construction projects of the United States and Canada from early planning to contract letting — CONSTRUCTION DAILY, 10th Ave. at 36th St., New York.

WASTE DISPOSAL

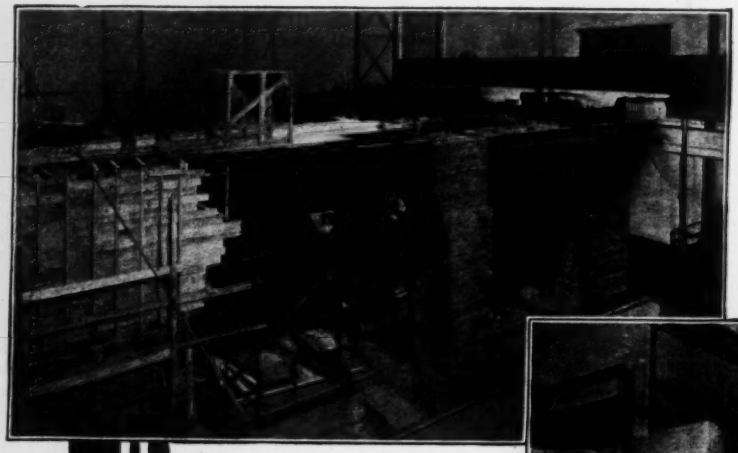
PROPOSED WORK

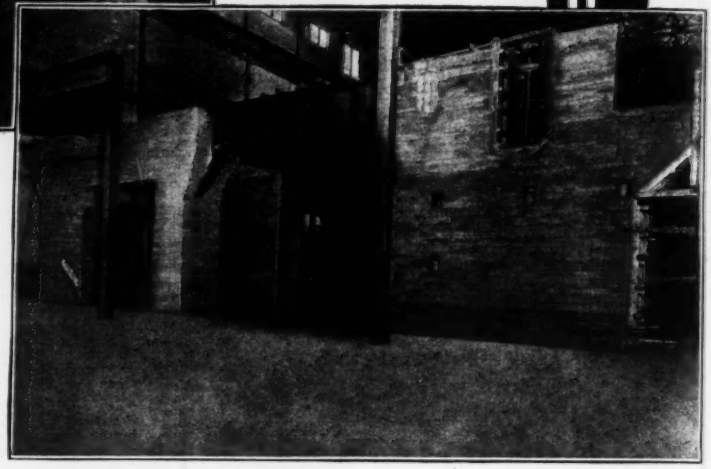
Pa., Erie—City sketches by F. A. Fuller, 721 Commerce Bldg., brick, steel garbage refuse incinerator plant, incl. brick chimney, 125 ft. high, North Side West 16th St. between Raspberry and Cranberry Sts. $140,000. J. F. Wadsworth, 817 Commerce Bldg., engr.

CONTRACTS AWARDED

Ont., Hamilton—F. H. Kent, city, clk., furnishing, installing 125-ton furnace for incinerator, to Municipal Incinerator Co., 715 Main St. E., $97,228. Noted Jan. 8.

Constr. News page 136





Concrete turbine foundation and floor at the Waukegan, Ill., plant of the Public Service Co. of Northern Illinois. Bates & Rogers Construction Co., Chicago, contractor. Universal Atlas quality concrete used.

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BRIDGES

PROPOSED WORK

Calif., San Leandro—Bd. Comrs. Alameda Co. (Oakland) bridge over San Leandro Creek, Park St. $30,000. G. A. Posey, Oakland, co. surv.

Ind., Goshen—Bd. Comrs. Elkhart Co. 200 ft. steel girder bridge, Road "S-5," Elkhart Twp. $80,000. W. S. Moore, South Bend, engr.

Mass., Arlington—Town, Bd. Selectmen, bridges, hy. improvements. $155,800 appropriated.

Mass., Clinton—Town, Bd. Selectmen, bridge, hys. improvements. $32,000 appropriated.

Mass., Franklin—Town, New York, New Haven & Hartford R.R., E. E. Oviatt, ch. engr., New Haven, Conn., new concrete, steel bridge, Clark Sq. $25,000 or more.

Mass, Lancaster — Town, Bd. Selectmen bridges, hys. improvements. $28,000 appropriated.

Mass., Lexington—Town, Bd. Selectmen, improving bridges, hys. $60,000 appropriated.

Mass., Maynard — Town, Bd. Selectmen, bridges, sewers, hy. improvements. $35,900.

Mass., Milton (br. Boston)—Town, Bd. Selectmen, bridges, hys. improvements. $112,000 appropriated.

Mass., Montague — Town, Bd. Selectmen, bridges, hys., playgrounds, sidewalks. $49,250 appropriated.

Mass., Norwood—Town, Bd. Selectmen, bridge and hy. improvements. $159,400 appropriated.

Mass., Pittsfield—City, Eng. Dpt., concrete, steel bridge, Columbus Ave. $25,000. A. B. Farnham, City Hall, engr.

Mass., Pittsfield—City, Engineering Dpt., bridge, probably concrete, Holmes Rd. $25,000. A. B. Farnum, City Hall, engr.

Mass., Sharon—Town, Bd. Selectmen, bridges, new roads, hy. improvements. $36,200 appropriated.

Mass., Southbridge — Town, Bd. Selectmen, bridges, new roads, improvements. $68,000 appropriated.

Mass., Stoneham—Town, Bd. Selectmen, plan new bridges, hy. improvements. $73,500 appropriated.

Mass., Watertown—Town, Bd. Selectmen, constructing new, and improvements and maintenance bridges, hys. $386,465 appropriated.

Mass., Winthrop — Town, Bd. Selectmen improving, repairing bridges, hys. $33,700 appropriated.

Miss., Ovett—Bd. Supervs. Jones Co., Court House, Ellisville, rejected bids Jan. 7, driving pile, fitting caps, new found., moving old steel span in construction new bridge over Bogue Home Creek on Moselle-Ovett Rd., near here. J. L. Wheless, Hattiesburg, engr. Noted Dec. 18.

Minn., Bemidji—State Hy. Dpt., 1246 University Ave., St. Paul, rein.-con. bridge over Mississippi River, near here.

Oklahoma—State Hy. Dpt., Oklahoma City, preliminary plans 9 span 118 ft., rein.-con. bridge near Binger, $35,000; 2 span 210 ft. steel truss bridge on concrete piers at Ft. Cobb, $40,000, both Caddo Co. A. R. Losh, hy. engr.

Okla., Marshall—Bd. Comrs. Logan Co. preliminary plans 130 ft. rein.-con. bridge. $25,000. A. O. Walker, Guthrie, engr.

W. Va., Weirton—Bd. Comrs. Hancock Co., New Cumberland, 150 ft. steel, concrete bridge over Kings Creek, on Route 2, near here. $100,000.

BIDS ASKED

Alabama and Mississippi—Apr. 28, by L. G. Smith, hy. dir., Montgomery, Ala., and C. M. Williams, dir. hys., Jackson, Miss., 1,400 lin.ft. treated piling, concrete, steel bridge over Escatawpa River, F.A.P. 230, in Mobile Co., Ala. and George Co., Miss.

Ala., Birmingham—Apr. 7, by A. J. Hawkins, city engr., bridge over Valley Creek, Lomb Ave., West End, incl. 1,100 cu.yd. earth excav., 953 cu.yd. Class A concrete, 209 lin.ft. rail rock, 124,765 lb. reinforced steel. $30,590.

California—Apr. 15, by State Hy. Comn., Sacramento, eighteen 26 ft. 6 in. span rein.-con. girder bridge on concrete pile bents over Berenda Slough, Madera Co. C. H. Purcell, hy. engr.

Calif., Los Angeles—Apr. 29, by Bd. P. Wks., City Hall, Sixth Street Viaduct, incl. 8,000,000 lb. reinforcing steel, 47,300 cu.yd. Class F and 500 cu.yd. Class G concrete, 37,015 ft. concrete pile (precast or cast in place), 1,200 tons structural steel, sanitary sewer, storm drain.

Ill., Chicago — Apr. 4, by City, City Hall, operators houses and enclosure walls for double leaf trunnion bascule bridge over Chicago River at North Clark St.; substructure and superstructure necessary for widening single span fixed deck, plate girder bridge over North Branch Chicago River, at North Kimball Ave. R. W. Wolfe, comr. Dpt. P. Wks.

Ill., Chicago—Apr. 24, by L. Nettlehorst, secy. Bd. Comrs. Lincoln Park, Clark and Center Sts., and M. E. Connelly, secy. Bd. South Park Comrs., 5700 Cottage Grove Ave., and H. E. Young, consult. engr. of each board, at office Chicago Plan Comn., 208 West Washington St., substructure and superstructure double leaf trunnion bascule bridge over main branch Chicago River at Outer Dr. improvement crossing; adv. E. N.-R. Apr. 2. Noted Mar. 12.

Indiana—Apr. 15, by State Hy. Comn., Indianapolis, 60 ft. bridge on Rd. 22, Grant Co.—80 ft. bridge, Rd. 56, Jefferson Co.—one 72 ft. bridge, one 84 ft. bridge, Rd. 41, Lake Co.—49 ft. 4 in. bridge, Rd. 212, Laporte Co.—one 30 ft., one 84 ft., one 40 ft. and one 24 ft. bridges, Rd. 43, Montgomery Co.—84 ft. bridge, Rd. 29, Porter Co.—48 ft. bridge, Rd. 42, Putnam Co.—one 50 ft. bridge and two 36 ft., one 39 ft., one 24 ft., three 36 ft. span overhead crossing over Baltimore & Ohio R.R., Rd. 36, Vermillion Co.—one 150 ft., one 32 ft. and one 40 ft. bridges, Rd. 24, White Co. J. J. Brown, dir.

Kansas—See "Streets and Roads."

Massachusetts—See "Streets and Roads."

New Jersey—Apr. 13, by State Hy. Comn., Trenton, 2 bridges, one over White Horse Pike, on Route S-41, Sect. 4, Berlin Twp., Camden Co., other over Great Egg Harbor River, Route 42, Sect. 6, Hamilton Twp., Atlantic Co. A. L. Grover, ch. clk.; adv. E. N.-R. Apr. 2.

Ohio—Apr. 11, by O. W. Merrell, dir. hys., Columbus, grading, paving 1,463 ft. Cleveland-Medina Rd., Medina Co., brick $44,264 or concrete. $38,806.

Wash., Port Angeles—Apr. 7, by Comrs. Clallam Co., Court House, 100 ft. steel span bridge with approaches on cedar piling over Lower Hoko River. F. Sullivan, Port Angeles, co. engr.

CONTRACTS AWARDED

Ind., Michigan City—Bd. Comrs. La Porte Co. (La Porte) steel lift bridge, Franklin St. to Roberts Supply Co., Lima, O., $247,000. Est. $300,000. Noted Feb. 26.

Iowa—State Hy. Comn., Ames, to A. Olson Constr. Co., Waterloo, one 5 x 49.5 ft. and one 16 x 11 ft. span slab bridges, one 50 x 24 ft. I-beam bridge, Black Hawk Co., $9,348; three 90 x 20 ft. span and one 70 x 20 ft. span pony truss bridges, Cerro Gordo Co., $37,211; one 90 x 20 ft. pony truss bridge with two 40 x 20 ft. I-beam approaches, Delaware Co., $13,766—to Schaaf & Jakobsen, Lake Park, 11 box culverts, Cerro Gordo Co., $5,310; 40 culverts, extensions, Delaware Co., $12,380—to Welden Bros., Iowa Falls, 1 box culvert, Hardin Co., $2,442—to W. Denny, West Liberty, 13 culverts, extensions, Linn Co., $3,100—to Graves Bros. Constr. Co., Melvin, 10 x 10 ft. box culvert extension, Woodbury Co., $2,990. Grand total, $86,547. Noted Feb. 12.

Kentucky—See "Streets and Roads."

Louisiana—State Hy. Comn., Baton Rouge, Industrial Canal Bridge, Orleans Parish, to Wisconsin Bridge & Iron Wks., 5023 35th St., Milwaukee, Wis., $277,480—Ouachita River Bridge, Catahoula Parish, to Gauger Constr. Co., Memphis, Tenn., $274,623—Black River Bridge, Catahoula and Concordia Parishes, to Doullut & Erwin, Inc., Q. & C. Bldg., New Orleans, $529,085—Houma-New Orleans Bridge, Jefferson Parish, to B. N. Davis, 1006 Tchoupt St., New Orleans, $13,321. Grand total $1,094,509. Noted Feb. 26 and Mar. 5.

La., New Orleans—Bd. Comrs., Lake Borgne Levee Dist., to Wills Contr. Co., St. Louis, Mo., known as Jackson Levee, back protection work incl. 300,000 cu.yd. excav., in St. Bernard Parish, embankment at $0.149 per cu.yd., lateral canals $0.112, stripping borrow pits $0.129. Noted Feb. 26.

Maryland—State Roads Comn., Baltimore, concrete floor for bridge (now under construction) over Mononacy River, Contr. F-172-57, Frederick Co., to T. D. Claiborne Co., Garrett Bldg., Baltimore, $8,725. Noted Mar. 12.

Neb., Columbus—Platte Co., 25 items, steel, concrete bridges, culverts, to Allied Contractors, Inc., Nebraska Natl. Bank Bldg., Omaha, $28,744.

Neb., Grand Island — Hall Co., G. Neumann, clk., 16 bridges, culverts, to Diamond Eng. Co., Grand Island, $25,412.

Neb., Lincoln—Lancaster Co. Sanitary Dist., I. W. C. Frampton, secy., 427 Bankers Life Bldg., opening and widening Salt Creek to Martin-Day Co., 312 Little Bldg., at $0.069 per cu.yd.

New Hampshire—State Hy. Dpt., Concord, superstructure, 90 ft. steel plate girder bridge, Warren, to Albany Bridge Constr. Co., Inc., 518 Broadway, Albany, N. Y., $11,172.

New Jersey—State Hy. Dpt., Trenton, bridge over Webster Ave., Route 4, Sect. 3, Bergen Co., to G. S. Curtis, 11 Park Pl., New York, $37,028. Noted Mar. 12.

O., Akron—Summit Co., 207 ft. rein.-con. girder span bridge, 60 ft. over Baltimore & Ohio R.R., West Tallmadge Ave., linking North and West Hills, to Clemmer-Noah Constr. Co., 129 West Bowery St., $56,036. Est. $75,000.

Oklahoma—State Hy. Dpt., Oklahoma City, 212 ft. bridge, incl. one 80 ft. and one 60 ft. steel truss and two 36 ft. I-beam spans on concrete piers at Atoka, Atoka Co., to D. C. Sampley, Sulphur, $24,713 est. $28,000—9 span 144 ft. reni.-con. bridge at Perry, Noble Co., to L. S. Fisher, Woodward, $32,947 est. $40,000—11 span 188 ft. rein.-con. bridge at Snyder, Kiowa Co., to Roberts & Fisher, Norman, $62,239 est. $75,000. Grand total $119,899.

Pa., Esmer (mail Fairview)—Nickel Plate R.R. Co., Terminal Tower Bldg., Cleveland, O., C. H. Tinker, bridge engr., bridge to have steel superstructure, concrete deck, to Industrial Constr. Co., 208 Euclid Ave., Cleveland, O. Est. $25,000. Noted Feb. 26.

Pa., Phila.—Dpt. P. Wks., Bureau Eng. & Surveys, City Hall Annex, A. Murdock, dir., underpass to carry western approach to University Bridge under 9 tracks Pennsylvania R.R. to Bravo Constr. Co., 30th and Market Sts., $108,000. Former contract rescinded. Noted Mar. 5.

Pa., Phila.—Dpt. P. Wks., Bureau Eng. & Surveys, City Hall Annex Schedule B, founds. for bridge under Pennsylvania R.R. at University Ave., to Bravo Constr. Co., 30th and Chestnut Sts. Former contract rescinded. Noted Mar. 26.

Tex., Houston—Harris Co., c/o H. L. Washburn, aud., rein.-con. bridge over Buffalo Bayou, on Post Oak Rd., to A. J. Smith, 323 East 15th St. Est. $35,000. Noted Mar. 5.

Washington—S. J. Humes, dir. Hys., Olympia, 4 bridges on Methow Valley Hy., Okanogan Co. to Triangle Constr. Co., 1220 Ide Ave., Spokane, $47,784. Noted Feb. 26, under "Streets and Roads."

Ontario — Dpt. P. Hys., Parliament Bldgs., Toronto, constructing L'Original Bridge over Canadian Natl. Ry. tracks, on Ottawa-Montreal Hy. to E. Brunet & Son, Hull, Que., Est. $35,000. Noted Feb. 5, under "Streets and Roads."

The quick, accurate new business finder. Advance news on new construction work contemplated, on which bids are asked and on which contracts are let. Gives the details you need to know in order to obtain additional business — CONSTRUCTION DAILY, 10th Ave. at 36th St., New York.

STREETS AND ROADS

BIDS ASKED

Arizona—Apr. 8, by State Hy Comn., Phoenix, grading, planing subgrade stabilizer on 10 mi. Florence-Tucson Hy., from Florence 10 mi. toward Coolidge, Pinal Co. W. W. Lane, hy. engr.

California—Apr. 8, by F. G. Sommer, dist. engr. State Hy. Comn. at Bishop, treating with heavy fuel oil as dust palliative 31.2 mi. road between Mojave and San Bernardino Co. line, Kern Co.

California—Apr. 15, by State Hy. Comn., Sacramento, grading, concrete surfacing 0.6 mi. Stanton Avenue-Foothill Blvd., Alameda Co.—untreated crushed gravel or stone surfacing 25.3 mi. Chester-Williards Rd., Plumas and Lassen Counties—grading 7.3 mi. Canton Creek-Piru Rd., Los Angeles Co. C. H. Purcell, hy. engr.

Calif., Laguna Beach—City Council taking bids grading, curbing, sidewalks, lighting system, 5 and 6 in. asphaltic concrete paving 75,000 sq.ft. Ocean Ave.

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., City Hall, taking bids grading, concrete walls, ballustrade, vitr. clay sewers, macadam surfacing Caroline St. between 22nd and 23rd Sts. $25,000 or more.

Calif., Santa Ana—Apr. 7, by Bd. Supervs. Orange Co., improving Placentia Ave., incl. 10,780 cu.yd. grading, shoulders, ditches, roadway, 50,000 sq.ft. gravel base, shoulders, 5,000 tons asphaltic concrete paving.

Delaware—Apr. 22, by State Hy. Dpt., Dover, clearing, grubbing, grading, concrete paving 2.96 mi. Couch's Bridge-Maryland line, Contr. 178—2.9 mi. Hartly-Sudlersville Rd., Contr. 181—1.51 mi. Green's Mill-Bowen's Garage Contr. 188; adv. E. N.-R. Apr. 2.

Florida—Apr. 6, by State Road Dpt., Tallahassee, clearing, grubbing, grading, drainage structures and alternate on 9-in. 6-in. 9-in. concrete and using 10-in. 8-in. 10-in. local materials on 4.38 mi. Road 4-A, Project 909-C, Dade Co. B. M. Duncan, state hy. engr.

Idaho—Apr. 7, at office A. Horbour, comr. P. Wks., Boise, grading, draining, crushed gravelling 13.077 mi. Old Oregon Trail from Burley to Montgomery Bridge, F.A.P. 108-B and 70-B, Minidoka and Cassia Counties.

Ill., Rock Island—Apr. 6, by Bd. Comrs. Rock Island Co., concrete surfacing 0.8953 mi. Sect. 14-M.F.T. and 0.9091 mi. Sect. 16-M.F.T., 18 ft.

Ind., Anderson—Apr. 15, by Bd. Comrs. Madison Co., concrete surfacing 1.5 mi. W. T. Turner Rd., 18 ft. $26,000. P. Phipps, Anderson, engr.

Ind., Laporte—Apr. 11, by Bd. Comrs. Laporte Co., concrete surfacing Iselman and Marthinson Rds. $4,198. R. W. Leets, Laporte, aud.

Ind., Newcastle—Apr. 7, by Bd. Comrs., Henry Co., concrete surfacing U. T. Moore Rd. $232,000. J. R. Leakey, Newcastle, aud.

Ind., Newcastle—Apr. 7, by Bd. Comrs. Henry Co., improving C. C. Wilhoit Rd. $112,236. J. R. Leakey, Newcastle, aud.

Ia., Algona—Apr. 7, at office Auditor Kossuth Co., grading 47 mi. local roads.

Ia., Cresco—Apr. 7, at office Auditor Howard Co., grading, incidental work 7 mi. trunk road.

Ia., Maquoketa—Apr. 7, at office Auditor Jackson Co., Maquoketa and Dubuque Co., Dubuque, grading 6.22 mi. trunk road. A. A. Rhomberg, Dubuque, and T. E. Riley, Maquoketa, engrs.

Ia., Montezuma — Apr. 7, at office Auditor Poweshiek Co., crushed stone or gravel surfacing 24 mi. trunk roads, 11 mi. local roads.

Constr. News page 137

Streets and Roads (Continued)

Ia., Onawa—Apr. 8, at office Auditor Monona Co., grading 12 mi. trunk road, gravel surfacing 7.5 mi. trunk road.

Ia., Toledo—Apr. 9, at office Auditor Tama Co., grading, incidental work 15.75 mi. trunk and local roads, gravel or crushed limestone surfacing 21 mi. trunk and local roads, also 4,080 lin.ft. culvert labor, clearing right-of-way, 14 rein.-con. box culverts, 3 carloads culvert pipe.

Kansas—Apr. 23, by State Hy. Comn., Court House, Mound City, grading, culverts 7.412 mi. Project 7-13, Federal Aid Project 270-B, incl. four 30 ft. span deck girder bridges; 5.935 mi. Project 7-14, Federal Aid Project 215-B, incl. six 30 ft. span deck girder bridges, Linn Co. W. V. Buck, Topeka, hy. engr.

Kansas—Apr. 24, by State Hy. Comn., Court House, Olathe **(P. means Project and F.A.P. Federal Aid Project)** ,grading, culverts, concrete slab bridge on 7.538 mi. P.50-44, F.A.P. 404-B—2.611 mi. P.10-44, F.A.P.315-D, incl. one 80-ft. steel truss and four 30 ft. deck girder span bridge—6.098 mi. P.-10-14, F.A.P. 315-G all Johnson Co.—grading, culverts, 1.164 mi. P.30-6, F.A.P.307-C—7.406 mi. P.30-7, F.A.P. 307-D—light type surfacing 5.411 mi. P.92-2, F.A.P.268-G—7.972 mi. P.92-2, F.A.P.268-F—1.067 mi. P.92-2, F.A.P.268-I, all Leavenworth Co. W. V. Buck, Topeka, hy. engr.

Louisiana — Apr. 28, by State Hy. Comn., Baton Rouge, concrete surfacing 14.1 mi. hy. from Ennes to intersection of Route 7, Beauregard Parish—7.1 mi. hy. through De Quincy, Calcasieu Parish—7.5 mi. hy. from Homer to hy. running east, Claiborne Parish—7.7 mi. Benson-Converse Hy., De Soto and Sabine Parishes—4 mi. hy. north and south through Francisville, West Feliciano Parish—17.4 mi. Darnell-Delhi Hy., West Carroll and Richland Parishes—9.9 mi. Bastrop-Mer Rouge Hy., Morehouse Parish—7.2 mi. hy. from Alexandria south—10 mi. Alexandria-Natchitoches Hy., both Rapides Parish—18.3 mi. Bernice-Ruston Hy., Lincoln and Union Parishes—8.1 mi. Oscar-Erwinville Hy., Pointe Coupee and West Baton Rouge Parishes—13 mi. Jennings-Lake Arthur Hy., Jefferson Parish—9 mi. Bogalusa-Sun Hy., Washington and St. Tammany Parishes—16.9 mi. Thobodaux-Houma Hy., Lafourche and Terrebonne Parishes—10.7 mi. New Roads-Morganza Hy. Pointe Coupee Parish—6 mi. hy. though Covington east and west St. Tammany Parish—10 mi. Eunice-Basile Hy., St. Landry and Evangeline Parishes—12.7 mi. Ville Platte-Opelousas Hy., Evangeline Parish—4 mi. hy. through Church Point, Acadia Parish—9.9 mi. Bastrop-Mer Rouge Hy., Morehouse Parish—asphaltic surfacing 13.5 mi. St. Francisville-Mississippi State Line Hy., West Feliciana Parish—21 mi. Eunice-Pine Prairie Hy., Evangeline and Rapides Parishes—11.5 mi. Amite-Franklinton Hy., Tangipahoa Parish—11.5 mi. Franklinton-Amite Hy., Washington and Tangipahoa Parishes—20 mi. Jonesboro-Lucky Hy., Jackson and Bienville Parishes—18 mi. Crowley-Eunice Hy., Acadia Parish—12 mi. Baton Rouge-Clinton Hy., East Baton Rouge and East Feliciana Parishes—18 mi. Scotland-St. Francisville Hy., West Feliciana Parish—16 mi. DeQuincy-Texas Line Hy., Beauregard and Calcasieu Parishes—19 mi. Eunice-Pine Prairie Hy., Evangeline and St. Landry Parishes—15 mi. Winnfield-Tullos Hy., Winn Parish—17 mi. Rayne-Lawtell Hy., Acadia and St. Landry Parishes—grading, drainage structures 10 mi. Alexandria-Glenmora Hy.—7.5 mi. Alexandria-Whittington Hy., both Rapides Parish—10.2 mi. White Castle-Donaldsonville Hy., Iberville and Ascension Parishes—9.3 mi. Chopin-Natchitoches Hy., Natchitoches Parish—6.9 mi. Converse-Noble Hy., Sabine Parish—7.5 mi. Whittington-Avyelles Parish Line Hy., Rapides Parish—bridge over Mermentau River at Lake Arthur, Jefferson Davis and Vermillion Parishes—bridge over Ouachita River at Sterlington, Union and Ouachita Parishes. O. K. Allen, chn.

Maryland—Apr. 7, by State Roads Comn., Baltimore, G. C. Uhl, chn., concrete paving 0.55 mi. Contr. S-50-14, Somerset Co.—3.89 mi. Contr. H-108-44, Hartford Co.—0.4 mi. Contr. Ho-82-36, Howard Co.—1.4 mi. Contr. P-135-34, Prince George's Co.

Md., Baltimore—Apr. 8, by Bd. Awards, sheet asphalt paving 8,650 sq.yd. streets listed in Contr. 593. N. L. Smith, Municipal Bldg., hys. engr.

Massachusetts—Apr. 7, by Dpt. P. Wks., State House, Boston, bituminous macadam paving 29,257 ft. hy. and 7 rein.-con. bridges, Becket—10,804 ft. hy. and constructing concrete, steel bridge, Hingham and Hull—rein.-con. paving 28,430 ft. hy. and concrete steel bridge, Northboro and Shrewsbury—24,721 ft. hy. and concrete, steel bridge, Framingham and Southboro. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., rejected bids Mar. 18, repaving approach to Prison Point Bridge, $25,000. Will probably readvertise. Noted Mar. 12.

Mass., Braintree—Apr. 6, by Town, Bd. Selectmen, cement curbing, sidewalks, $25,000.

Mass., Marblehead—See "Contracts Awarded."

Mass., Rockport—Town, R. P. Parker, in charge, Town Hall, taking preliminary bids concrete walk, wall at Long Beach. $38,000. Morse & Dickenson, 25 Washington Sq., Haverhill, engrs.

Mich., Hillsdale—Apr. 8, by Hillsdale Co. Road Comn., grading, drainage structures, 60 per cent gravel surfacing 4 mi. Assessment Dist. 29, 16 ft. F. Rogers, Hillsdale, co .engr.

Constr. News page 138

Minn., Hibbing—S. Shepard, engr., St. Louis Co., Court House, Duluth, bids early in April, concrete paving 5.25 mi. $135,000.

Mo., St. Louis—Apr. 21, by Bd. P. Serv., City Hall, grading, concrete paving 17,500 sq.yd. alleys in City Blocks 1264, 2434B, 2942, 2750, 3134, 3710, 4038, 4410B, 4456, 5179, 5180, 5344, and 5431. W. W. Horner, city engr.

Montana—Apr. 29, by State Hy. Comn., Helena, grading, surfacing, bridging, Evaro Arlee Rd., —15 mi. Harlowtown Rd.—14 mi. Toluca-Hardin Rd. 1—oiling 15 mi. Anaconda-Georgetown R.—surfacing 20 mi. Jefferson Canyon and Sappington Rd.—grading, surfacing Garrison-Avon Rd. R. D. Rader, state hy. engr.

Neb., Omaha—Apr. 14, by Clerk Douglas Co. Court House, grading concrete paving 11,400 sq.yd. Underwood Ave. from Fairacres to Lincoln Hy. L. E. Adams, Court House, co. engr.

Nevada—Apr. 8, by Directors State Hy. Dpt., Carson City, grading, crushed rock or crushed graveling 85,800 cu.yd. between Winnemucca and point 6 mi. west of Stonehouse, Route 1, Sect. A4, B, C1 and 2, Humboldt Co.; constructing 9.16 mi. road from Washoe Summit and Huffaker's, Route 3, Sect. A-1, Washoe Co. S. C. Durkee, state hy. engr.

New Jersey—Apr. 13, by State Hy. Comn., Trenton, grading, 10 in. rein.-con. paving 2.154 mi. Route S-1-A, Sect. 2, Palisade Ave. to New York Ave., Fort Lee, and Route 1, Sect. Myrtle Ave. to Palisade Ave., Englewood Cliffs, Bergen Co.; grading, bridging, bituminous concrete paving 4.315 mi. Hasbrouck Heights to Route 4, Route 2, Sect. 6, Bergen Co. A. L. Grover, ch. clk.; adv. E. N.-R. Apr. 2.

N. J., Belvidere—Apr. 22, by Bd. Freeholders Warren Co., Court House, grading, draining State Hy. Route 8, Sect. 4, from Delaware to Columbia, in Knowlton Twp. H. W. Vetter, Court House, co. engr.; adv. E.N.-R. Apr. 2.

N. J., Hackensack—Apr. 6, by Hackensack Impvt. Comn., Municipal Bldg., grading River St. from Hudson to Court Sts., and River St. from Court St. to Hackensack Ave. $190,000. F. Campbell, city engr.

N. J., Little Silver—Apr. 14, by Bd. Boro Council, rein.-con. paving 18,000 sq.yd. Seven Bridge Rd. Allen & Randolph, 60 Broad St., Red Bank, civil engrs.; adv. E. N.-R. Apr. 2.

N. J., Madison—Apr. 9, by Twp. Com., rein.-con. paving 0.784 mi. Ocean Blvd. from State Hy. 35 to Whale Creek. O. F. Mitchell, 280 Hobart St., Perth Amboy, civil engr.; adv. E. N.-R. Apr. 2.

N. J., New Brunswick—Bd. Freeholders Middlesex Co., Mar. 20, concrete paving Woodbridge-Iselin-Oak Tree Rd., from C. Sebolt, Bordentown Ave., South Amboy, $52,779. Est. $65,000. Noted Mar. 12.

N. J., Ogdensburg—Apr. 14, by Bd. Boro Council, Sussex Co., Newton, grading, concrete paving 1,256 sq.yd. Plant St. Snook & Hardin, Newton, engrs.; adv. E. N.-R. Apr. 2.

N. J., Ogdensburg—Apr. 14, by Bd. Freeholders Sussex Co., Newton, curbing, grading, concrete on earth paving 4,924 sq.yd. Edison Rd., Ogdensburg Boro. Snook & Hardin, Newton, engrs.; adv. E. N.-R. Apr. 2.

New York—Apr. 21, by A. W. Brandt, comr. Hys., Albany, improving hys. in Greene, Otsego, Seneca and Warren Counties; reconstructing hys. in Allegany, Chenango, Columbia, Franklin, Herkimer, Madison and Oneida Counties; adv. E. N.-R. Apr. 2.

N. Y., Brooklyn—Apr. 8, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall grading, granite block on concrete paving Rock St.—grading, asphalt on 6 in. concrete paving Kings Highway, Lenox Rd., Terrace and Prospect Pls., Elmwood, Bay and 19th Aves., East 18th, President, 77th Sts.—grading, Clarendon and Cortelyou Rds., Cleveland, East 35th, East 54th, Hubbard Sts.

N. Y., Long Island City—Apr. 6, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., bituminous macadam paving 86th St.—granite block on concrete paving 44th Dr.—grading, sheet asphalt on macadam paving Queens Ave.—grading, curbing, sidewalks, Northern Blvd., 101st and Leverich Sts., 53rd, Grandview, Ash, Pierce Aves.—grading, curbing, sheet asphalt on concrete paving 70th, 84th and 113th Sts., Gates, 115th 21st, and Pierce Aves.—constructing ramps, approaches to boardwalk at foot Beach 26th, Beach 28th, and Beach 37th Sts.

N. Y., New York—Apr. 8, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Ave., granite block on concrete paving East Tremont and Westchester Ave.—granite block and sheet asphalt on concrete paving Hunts Point Ave.—sheet asphalt on concrete paving Morris Park Ave.—grading, curbing, sidewalks, guards rails West 263rd St. and Hobart Ave.

North Dakota—Apr. 10, by State Hy. Comn., Bismarck, grading, graveling, concrete paving 135,195 sq.yd. Fargo-Mapleton Rd., 137-A-C. $350,000.

Ohio—Apr. 7, by O. W. Merrell, hy. dir. Columbus, concrete paving 1.198 mi. Sect. "L" Marietta-Athens Rd., Washington Co., 20 and 36 ft., $75,980—0.758 mi. Sects. "A-2" and "M." Ohio River Rd., $21,280—and 4.575 mi. Sects. "F" "G" and others, same road, $149,050, both Gallia Co.—paving 4.08 mi. Sect. "C" Jackson-Piketon Rd., Jackson Co., brick $206,082, concrete $147,834—0.189 mi. Sects. "I" and "V" West Lafayette-New Philadelphia Rd., Coshocton Co., $15,850, all foregoing 20 ft. wide—paving 5.541 mi. Sects. "M" and "N." National Rd., Licking Co., 30 ft., brick, incl. furnishing and delivering brick $392,937, concrete $294,006.

Ohio—Apr. 11, by O. W. Merrell, dir. h Columbus, grading, paving, 1.468 ft. Cleve Medina Rd., Medina Co., brick, $44,264 or crete. $38,806.

Ohio—O. W. Merrell, hy. dir., Columbus, celled bids to have been opened Feb. 24, con. widening 0.957 mi. Sect. "M" Cincin Chillicothe Rd., Hamilton Co., $59,562—b or concrete paving 2.417 mi. Sects. "M" "Q" Dayton-Troy Rd., Montgomery Co., $65,8 paving 0.537 mi. Sect. "D" Findlay-Upper S dusky Rd., Wyandotte Co., concrete $15,1 rock asphalt $17,880, all foregoing 18 ft. w Noted Feb. 12.

O., Canton—Bd. Control bids about May improving Schroyer Ave. S. W. from 6th to Sts., 40 ft. $37,871. J. Shisler, City Hall en

O., Lisbon—Comrs. Columbiana Co., b about May 17, hard-surfacing (probably c crete), 2.286 mi. Wellsville-Salineville Rd. ft. $85,325. L. C. Kirk, Lisbon, engr.

O., Wellsville—Bd. Control, bids about M 23, paving 1 mi. Clark Ave. between 17th 25th Sts., 40 ft. $90,000. R. D. McGill, Wellsville, engr.

Okla., Oklahoma City—M. Peshek, Jr., c clk., rejected bids Mar. 10, grading, paving blocks Shartel St. from 34th to 42nd Sts. $3 210. G. F. Brown, City Hall, engr.

Pennsylvania—Apr. 9, by State Hy. Dpt., Harrisburg, grading, drainage structures, bridge rein.-con. surfacing 757 ft. Route 108, Sect. 3-X Scott Twp. Heidelberg Boro, Allegheny Co. 1,965 ft. Route 703, Application 9625-A, Penn Twp., Armstrong Co.—2,226 ft. Application 6849-A, Allegheny Twp., Blair Co.—5,578 ft Route 137, Honey Brook and Salisbury Twps. Chester and Lancaster Counties—bituminous surface treated macadam on bank run gravel surfacing 51,001 ft. Route 20, Sects. 14 and 15 McIntyre, Union and Canton Twps., Lycoming Tioga and Bradford Counties—24,233 ft. Route 1, Sunbury, Upper Augusta and Lower Augusta Twps., Northumberland Co.—bituminous treated macadam on native stone surfacing 44,344 ft Route 479, Sect. 2, Nicholson, Lemon and Tunkhannock Twps., Nicholson Boro, Wyoming Co S. S. Lewis, secy.

Pennsylvania—Apr. 17, by State Hy. Dpt Harrisburg, grading, drainage, surfacing 54 mi roads in Armstrong, Butler, Venango, Berks Bucks, Cambria, Clarion, Clearfield, Elk, Huntington, Susquehanna nad Union Counties. S. S Lewis, secy.; adv. E. N.-R. Apr. 2.

Pa., Ambridge—Apr. 20, by A. Johns, boro mgr., 10th and Merchant Sts., grading, curbing guttering, paving Melrose Ave. between Virg St. and Central Lane. $50,000. Private plans

Pa., Duquesne—Apr. 6, by City Clerk, Municipal Bldg., grading, sewers, curbing, sidewalks on Kennedy Ave., from Peter to Mifflin Sts.—Priscilla Ave., from Auriles to Catherine Sts.—storm sewer in Milton Alley, $25,000. R. B Dell, Municipal Bldg., engr.

Pa., Titusville—Apr. 13, by G. A. Hughes, city clk., grading, curbing, paving 2nd St. $45,000. G. M. Fay, City Hall, engr.

Tex., Marshall—Apr. 14, by City, paving mi., streets 20 to 36 ft. $31,195. W. C. Albright, Marshall, engr.

Tex., Memphis—Apr. 25, by Hall Co., c/o A. C. Hoffman, judge, paving 14 mi. hy. from Memphis to Lakeview, 18 ft. C. L. Hasie, Memphis, engr.

Washington—Apr. 14, by S. J. Humes, dir. Hys., Olympia, concrete paving 3.9 mi. State Rd. 2, Reardon to Davenport Gaps and Extensions, Emergency F.A.P. 156-A, Lincoln Co.—crushed stone surfacing 13 mi. State Rd. 8, Goldendale to south of Summit, Emergency F.A.P. 162-B and C, Klickitat Co.—grading, draining 4 mi. State Rd. 8, Skdat to Grand Dalles, Emergency F.A.P. 174-C, Klickitat Co.—grading, crushed stone surfacing and resurfacing 24 mi. State Rd. 10, Omak, to Tonasket, Okanogan Co.

West Virginia—Apr. 14, by State Road Comn., Charleston, grading, drainage structures, gravel surfacing 1.73 mi. Sutton-Summersville Rd., Project 3456-B Braxton Co.—concrete surfacing 1.7 mi. Lewisburg-Caldwell Rd., Project 14-D—3.76 mi. Caldwell-White Sulphur Rd., Project 140-C, both Greenbrier Co.—5.4 mi. West Hamlin-Four Mile Creek Rd. Project 150-B Lincoln Co.—1.57 mi. Bethlehem-Elm Grove Rd., Project 3486 Ohio Co.—9.5 mi. Bruceton-Pennsylvania Line Rd., Project 189-A Preston Co.—5.25 mi. Hundred-Sugar Run Rd., Project 3300-A and B, Wetzel Co.—surface treating 10.08 mi. Justice-Wyoming Co. line and McDowell Co. Line-Mingo Rds., Projects 3284 and 3128 Mingo and McDowell Counties—2.2 mi. Poca-Country Club Rd., Projects 3246 and 3418 Putnam Co.—stone top surfacing 2.05 mi. Summersville-Duffy Branch Rd., Project 3293-B Nicholas Co.—retread top surfacing 2.07 mi. Bruceton-Little Sandy Rd., Project 3289 Preston Co.—retread surfacing 2.05 mi. Charleston-Winfield Rd., Project 3134-A Kanawha Co.—11 mi. Fenwick-Craigshead Rd., Projects 3421, 2220 and 2221 Nicholas Co. Good Hope Bridge 1247 over West Fork River, Project 3225-C Harrison Co., incl. 150 ft. steel through truss span superstructure on concrete substructure—Conway Bridge 1236 over Buffalo Creek, concrete substructure, Project 180-B Marion Co.—11,600 lin.ft. wire rope guard rail between Junior and Belington and Fetterman and Blueville, State Route 56, U. S. Route 50 Barber and Taylor Counties—25,000 lin.ft. wire rope guard rail between Logan and Harts, State Route 10, Lincoln and Logan Counties—85,000 lin.ft. wire rope guard rail between Clothier-Blair and Steamwell Crossing, State Routes 2 and 10

Streets and Roads (Continued)

Logan Co.—65,000 lin.ft. wire rope guard rail between Athens, Princeton and Glenlyn. State Routes 24 and 44, Mercer Co.—14,000 lin.ft. wire rope guard rail between Deep Hollow and Little Sandy Rd. Project 3380 Preston Co. E. D. Yewell, hy. engr.

Ont., Kitchener—Apr. 8, by L. S. Lichty, engr., Court House, concrete paving 15,840 sq.yd. Suburban Rd. 15, for Waterloo Co. $45,000.

CONTRACTS AWARDED

Alabama—L. G. Smith, hy. dir., Montgomery, limerock asphalt on block paving 6 mi. Hamilton-Guin Rd., Marion Co., to Morgan-Hill Paving Co., Martin Bldg., Birmingham, $99,100—10.91 mi. Tuscumbia-Barton Rd., Colbert Co., to Municipal Paving & Constr. Co., Cotton States Bldg., Nashville, Tenn., $187,920—concrete paving 12.5 mi. Athens-Huntsville Rd., Montgomery Co., to Wesco Co., Volunteer Life Bldg., Chattanooga, Tenn., $225,670—bridges on Tuscumbia-Barton Rd., Colbert Co., to L. C. Brittian, Jasper, $9,708. Grand total $522,398. Noted Feb. 5.

California—C. H. Purcell, engr. State Hy. Comn., Sacramento, grading existing road bed 29.8 mi. 36 ft. wide, bituminous treated crushed gravel surfacing shoulders 6 ft. on each side Golden State Hy., Kern Co., to A. Teichert & Son, 1846 37th St., Sacramento, $264,405; grading 30 ft. wide, concrete surfacing 20 ft. 6.9 mi. Yuma-El Centro Hy., Imperial Co., to Jahn & Bressi Constr. Co., 724 South Spring St., Los Angeles, $246,160. Noted Feb. 26.

California—State Hy. Comn., Sacramento, grading San Julian Rd., Santa Barbara Co., to Donovan & Sons, 4031 Goodwin Ave., Los Angeles, $41,800; grading, oil treated crushed gravel or stone surfacing 13.6 mi. Cronise Valley-Baker Rd., San Bernardino Co., to McCrary Co., 4482 East Worth St., Los Angeles, $247,706. Noted Feb. 19.

Calif., Long Beach—City Council, curbing, sidewalks, 6 in. asphaltic concrete surfacing 123,000 sq.ft. Magnolia Ave. between Anaheim and State Sts., to Sully-Miller Contg. Co., 1500 7th St., Long Beach, $29,297.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, sanitary sewers, curbing, sidewalks, 8 in. concrete paving 182,500 sq.ft., 6 in. concrete paving 33,000 sq.ft., 8 in. asphaltic concrete paving 30,000 sq.ft. Florence and Victoria Ave. Impvt. Dist., to Campbell-Reichert Co., 4000 Whiteside Ave., Alhambra; $152,205.

Calif., Los Angeles—Los Angeles Co., grading, 3 and 4 in. oil macadam surfacing 465,797 sq.ft., and 1 1½ in. oil macadam surfacing 199,096 sq.ft. shoulders, Avacoda Crest Rd., to J. J. Lilley, 244 East Amerige St., Fullerton, $64,650.

Calif., Newport Beach—City Council, curbing, waterworks, sewers, sidewalks, 4 in. concrete paving 139,500 sq.ft. River Ave. between 38th and 42nd Sts., et al, to O. U. Miracle, 980 Magnolia Ave., Whittier, $66,701. Noted Dec. 25.

Calif., Oakland—Grading, curbing, sidewalks, penetration macadam paving 80,550 sq.ft. Masonic Ave. between Florence and Proctor Aves., to U. B. Lee, 888 Rodney St., $26,170.

Calif., Palo Alto—City Council, E. L. Roach, city clk., curbing, sidewalks, grading, 6-in. concrete paving 309,000 sq.ft. Palo Alto Ave., et al., to A. J. Raisch, 46 Kearny St., San Francisco, $65,247. Noted Mar. 5.

Calif., San Jose—H. Pfister, clk. Santa Ana Co., oil macadam surfacing Congress Springs Rd. and Cadwallader Ave., to San Jose Paving Co., San Carlos and Dupont Sts., San Jose, $29,349 and $2,935 respectively; San Jose-Almaden Rd., to A. J. Reisch, Burrell Bldg., $14,770. Grand total $47,054. Noted Mar. 5.

Calif., San Luis Obispo—San Luis Obispo Co., grading, asphaltic concrete paving 9.8 mi. Santa Margarita-Atascadaro Rd., to Hanrahan Co., Standard Oil Bldg., San Francisco, $209,700.

Calif., San Mateo—Bd. P. Wks., City Hall, grading, curbing, sidewalks, 6 and 8 in. concrete paving Poplar St., to Hanrahan Co., Standard Oil Bldg., San Francisco, $25,572.

Colorado—State Hy. Dpt., Denver, concrete paving 10 mi. roads in Weld and Morgan Counties, to E. Selander, Greeley, $251,717; 10 mi. same road, Weld Co., to J. B. Bertrand, Inc., Union Station, Denver, $254,342.

Colorado—State Hy. Dpt., Denver, improving 0.057 mi. State Hy. 13 and 0.053 mi. State Hy. 4 at Rifle, Garfield Co., to H. S. Crocker, Tramway Bldg., Denver, $20,400 and $21,300 respectively.

Conn., Hartford—Bd. Contr. & Supply, excavating, sub-grading, concrete paving 3,560 sq.yd. airport run-ways at Brainard Field, to Edward Balf Co., 14 Haynes St. Est. $25,000. Noted Mar. 19.

Georgia—J. W. Barnett, engr., East Point, concrete paving 8.2 mi. Eatonton-Madison Rd., Putnam Co., to Rutherford Constr. Co., Lake Wales, Fla., $182,263; concrete paving 4.8 mi. and 4 culverts, Statesboro-Savannah Rd., Effingham Co., to Espy Paving & Constr. Co., Savannah, $157,882. Noted Mar. 19.

Idaho — P. Wks., Boise, grading, draining, crushed graveling 2.558 mi. Elmore Co., to J. A. Terteling & Sons, Moscow, $33,681; widening 40 ft. bridge at Alkali Creek, 40 ft. bridge at Clover Creek, 22 ft. bridge at King Hill Creek, and 22 ft. span at Bennett Creek, Elmore Co., to Farmers Lumber & Supply Co., Gooding, $10,479. Noted Mar. 5.

Ill., Chicago—Bd. Local Impvts., City Hall, paving 3.57 mi. Ashland Ave., from 12th St. to Roosevelt Rd., to J. A. McGarry & Co., 189 West Madison St., $298,816—Ashland Ave. from 31st to 39th Sts., to Calumet Coal Co., 9022 Commercial Ave., $401,522—Ashland Ave. from 42nd to 47th Sts., to Chicago Constr. Co., 228 North La Salle St., $303,025. Grand total $1,003,363.

Ill., Galesburg—State Aid Roads Comn., Knox Co., furnishing, unloading, hauling, spreading 25,000 cu.yd. gravel on 15 mi. State Aid Route 8, Sect. S-1-B. State Aid Route—1-D. Sect. M., to T. O. Miles, 553 Mulberry St., $59,069, est. $66,000; grading 6 mi. State Aid Route 8, Sect. 1-A MFT, to Central Eng. Co., 809 Putnam Bldg., Davenport, Ia., $10,073; est. $15,000. Noted Mar. 19.

Ill., Robinson—Crawford Co., traffic bound gravel surfacing 22,879 ft. State Route 14, Sect. 2, 10,300 ft. State Aid Route 13, Sect. 3, and 5,100 ft. State Aid Route 13, Sect. 3W, to Dees Bros., Oblong, $44,370; concrete surfacing 0.5752 mi. Project 4-15D, 9 ft., to Breeden Bros., Springfield, $7,267. Noted Feb. 26.

Indiana—State Hy. Comn., Indianapolis, concrete surfacing 142,444 sq.yd. Tipton-Alexandria Rd., Rd. 28, Federal Aid Project 172-AB, Tipton and Madison Counties, to Grace Constr. Co. & Supply Co., 903 1st Natl. Bank Bldg., Ft. Wayne, $194,082. Est. $240,410

Ind., Fowler—Benton Co., stone surfacing, 1 mi. Anderson Rd., to J. F. Fenwick, Goodland, $7,600; Lowman Rd., to I. G. Johnson, Lynn, $11,261.

Ind., Paoli—Orange Co., macadam surfacing 8,250 ft. Mattox Rd., to Wilson Bros., Paoli, $5,139—South Liberty Rd., to Qualkinbush Bros., Paoli, $16,420—Andrew Rd., to Kearby & Cave, French Lick, $6,750. Grand total, $28,309. Est. exceeds $30,000.

Ind., Shoals—Martin Co., gravel surfacing Gilksion and Mullen Rds., to W. Patterson, Loogootee, $111,550—Treadway and Montgomery Rds., to E. Harding, Shoals, $9,900—Crane Rd., to J. C. O'Brien, Loogootee, $3,445. Grand total, $124,895. Est. $25,000.

Ind., Terra Haute—Vigo Co., brick surfacing 1.530 ft. Hyland Rd., to H. Shepherd, Terra Haute $9,620 es. $9,749; gravel surfacing 2.18 mi. Leak Rd., to W. Zimmerman, Terra Haute, $11,396; est. $16,332. Noted Mar. 5.

Iowa—State Hy. Comn., Ames, grading, drainage structures, paving 4.592 mi. roads in Boone Co., to Bemis & Schlick, 503 Southern Surety Bldg., Des Moines, $134,237—13.872 mi. Clay Co., to G. G. Herrick, 7th and Corning Sts., Des Moines, $250,371—10.008 mi. Delaware Co., to Capitol Constr. Co., 1207 Cherry St., Des Moines, $303,333—9.384 mi. Linn Co., to Koss Constr. Co., 205 Old Colony Bldg., Des Moines, $244,390—grading, drainage structures 7.184 mi. Jackson Co., to Shirley Constr. Co., Union Bank Bldg., Omaha, Neb., $83,296—8.3 mi. Washington Co., to W. D. Dollen & Son, and W. P. Collins, Neola, $44,297. Grand total, $1,059,924. Noted Feb. 12.

Ia., Adel—Dallas Co., grading 22.5 mi. roads, to Sargent & Roth, Keystone, $32,862.

Ia., Clinton—Clinton Co., grading 10 mi. roads, to Foley Bros., Anamosa, $18,722; 9 box culverts, extensions, to J. J. Kane, Charlotte, $3,000; 7,800 ft. culvert pipe, to Iowa Culvert & Pipe Co., Mason City, $8,955; 4,000 ft. creosoted piling, to M. R. Field, Des Moines, $1,245. Grand total $31,922.

Ia., Decorah—Winneshiek Co., grading, surfacing secondary road system, to F. J. Balmer, Waterloo, $46,642; 8 culverts, to Ward & Taylor, Decorah $2,110.

Ia., Des Moines—Polk Co., grading 82,000 sq.yd. roads, to F. Braden, Elliott, at $0.17 per cu.yd.

Ia., Independence—Buchanan Co., gravel surfacing 18.25 mi. secondary roads, to Baumgardner & Schroeder, Wapello, $5,420—lumber, to Wheeler Lumber, Bridge & Supply Co., Des Moines, $7,596—corrugated pipe culverts, to Iowa Culvert & Pipe Co., Mason City, $3,783. Grand total $16,799. Noted Feb. 12.

Ia., Indianola—Warren Co., grading 4.048 mi. U.S. Rd. 65, to Reed & Wheelock, Clay Center, $10,420; 3.06 mi. Project 7, to G. Longerbone 15th and Market Sts., Des Moines, $14,949. Noted Mar. 5.

Ia., Mt. Pleasant—Henry Co., grading 9.056 mi. U. S. Hy. 161, to F. Patik, Cedar Rapids, $11,132. Noted Mar. 5.

Ia., Osage—Mitchell Co., grading trunk roads, to J. Brown, Madison Lake, Minn., $15,149.

Ia., Tipton—Cedar Co., stone surfacing secondary road system, to Baumgardner & Schroeder, Wapello, $19,696.

Ia., Toledo—Maintenance graveling 46.35 mi. county trunk road system, incl. 11,775 cu.yd. gravel or crushed stone complete on roads, to McDougall Constr. Co., Sioux City, $29,673.

Ia., Toledo—Tama Co., grading 26.6 mi. secondary roads, to J. F. O'Neill, Des Moines, $54,249. Noted Mar. 19.

Kansas—State Hy. Comn., Court House, Oskaloosa, grading, drainage structures, culverts 6.597 mi. roads in Riley Co. and 5.711 mi. Lyon Co., to Kries Constr. Co., Council Grove, $47,091 and $46,386 respectively—concrete surfacing 5.983 mi. Jefferson Co., to J. A. Toin, 7601 Myrtle St., Kansas City, Mo., $199,471. Grand total $292,948. Noted Mar. 5.

Kansas — State Hy. Comn., Court House, Salina, concrete surfacing 2.031 mi. U. S. Hy. 81, Federal Aid Project 287-A and 2.981 mi. same road, Sect. B, McPherson Co., to Roberts Constr. Co., Wichita, $45,952 and $66,830 respectively—0.753 mi. road in Salina Co., to Koss Constr. Co., Old Colony Bldg., Des Moines, Ia., $238,309—0.86 mi. Geary Co., to Brosnahan Bros., 218 City Bank Bldg., Kansas City, Mo., $30,567—4.427 mi. Marion Co., to List & Clark, Railway Exch. Bldg., Kansas City, Mo., $24,028. Grand total $405,686. Noted Mar. 5.

Kansas—State Hy. Comn., Court House, Stockton, grading, culverts 17.257 mi. U. S. Hy. 40, Federal Aid Project 379-C, 30 ft. Rooks Co., to G. W. Condon, 223 Gram Exch. Bldg., Omaha, Neb., $140,553.

Kansas—State Hy. Comn., Court House, Iola, grading, drainage structures, culverts 4.994 mi. roads in Anderson Co., 30 ft., to A. G. Sherwood, Independence, $22,401; concrete surfacing 2.676 mi. Allen Co., 20 ft., to Bresnahan Bros., Kansas City, Mo., $61,991. Noted Mar. 19.

Kansas—State Hy. Comn., Court House, Liberal, oil and light type surfacing 6.499 mi. roads in Larned Co., to San-Ore Constr. Co., McPherson, $28,354—9.072 mi. Gray Co., to D. H. Hardman, Alton, $35,144—grading, culverts, oil surfacing 13.831 mi. Stevens Co., to A. L. Cook, Ottawa, $57,701. Grand total $121,199. Noted Mar. 19.

Kan., Ft. Scott—Bourbon Co. grading, culverts, stone surfacing 12.5 mi. Uniontown-Majella Rd., 26 ft., day labor if it is decided to build this year. G. C. Thompson, Court House, engr.

Kan., Kansas City—City Clerk, improving 18th St., 40,000 sq.yd. new top surface, 20,500 sq.yd. 8 in. concrete base, to Granite Bituminous Paving Co., Railway Exch. Bldg., St. Louis, Mo., $96,749.

Kan., Newton—City Council, 2½ in. brick on concrete paving 15,600 sq.yd., to Stanton Constr. Co., Newton.

Kentucky—State Hy. Dpt., Frankfort, grading, drainage structures, traffic bound macadam surfacing 4.313 mi. Bowling Green-Scottsville Rd., Warren and Allen Counties, to Berry & Kelly, Louisville, using 1st class pipe $38,789. Noted Mar. 19.

Kentucky—State Hy. Dpt., Frankfort, traffic bound macadam surfacing 7.723 mi. roads in Crittenden Co., to T. J. Atkins, New Albany, Ind., $31,446—10.641 mi. Edmonson Co., to Campbell & Co., Bowling Green, $48,105—rein-con. surfacing 10.944 mi. Floyd Co., to Lewis & Kelly Constr. Co., Harlan, $209,530—6.66 mi. Gallatin Co., to Bowyer & Johnson, Henderson, Tenn., $122,003—10.352 mi. Trimble Co., and 5.444 mi. Webster Co., to Gorrell Barrow & Kirkpatrick, Russellville, $192,478, $142,034 respectively—9.643 mi. Union Co., to N. E. Stone, Madisonville, $159,457—rock asphalt and waterbound macadam surfacing 9.559 mi. Hancock and Breckinridge Counties, to Blair & Franse, Lexington, $156,849—light and medium tar on waterbound macadam surfacing 4.079 mi. Letcher Co., to J. M. Perkins & Co., Frankfort, $56,057—grading, drainage structures, using 1st class pipe 8.048 mi. Cumberland Co., to Cumberland Constr. Co., Burkesville, $174,840—7.7 mi. Franklin and Anderson Counties, to J. C. Macht, Newport, $86,284—11.475 mi. Todd Co., to Frazier & Cock, Wickliffe, $60,345—grading, drainage structures, surfacing 0.321 mi. bridge approaches, also three 41 ft. span rein.-con. bridge over Long Run Creek, Jefferson Co., and grading, drainage structures, surfacing bridge approaches, also deck girder bridge over Colly Creek, Letcher Co., to O. V. Arnett, Berea, $13,678 and $10,893 respectively—grading, drainage structures, surfacing bridge approaches, also two 26 ft. span rein.-con. deck girder bridge over Sand Lick Creek, Letcher Co., to Hart Constr. Co., Whitesburg, $8,002. Grand total $1,472,001. Noted Feb. 12.

Louisiana—State Hy. Comn., Baton Rouge, to Altman-Rogers Co., Little Rock, Ark., concrete surfacing 14 mi. roads in Union and Claiborne Parishes $310,672—to Lawrence Constr. Co., Jackson, Miss., 8.5 mi. St. Tammany Parish $225,342—to Meyer Greenwald Constr. Co., Monroe, 8.651 mi. Vermillion and Iberia Parishes $204,710; 9.626 mi. Ouachita and Caldwell Parishes $228,348; 8.117 mi. Catahoula and Franklin Parishes $188,840; 9.889 mi. Ouachita Parish $158,268; 25.143 mi. St. Mary Parish $534,587—to Southern Paving Co., Volunteer Life Insurance Bldg., Chattanooga, Tenn., 11.807 mi. St. Landry Parish $28,053; 9.617 mi. Point Coupee Parish $243,150—to R. W. Briggs & Co., New Orleans, 11.93 mi. Natchitoches Parish $326,108—to Stevens Bros. & Miller Hutchinson Co., Sellers St., New Orleans, 5.431 mi. East Feliciana Parish $131,595—to J. B. McCrary Co., Citizens & Southern Trust Bldg., Atlanta, Ga., 10.28 mi. De Soto Co. $218,633—to W. R. Aldrich & Co., Dyersburg, Tenn., 4.658 mi. Natchitoches Parish $128,803; 9.825 mi. Iberville Parish $329,343—to Bishop & Weir, 6451 East Six-Mile Rd., Detroit, Mich., 10.307 mi. Franklin Parish $205,030—to Couch Constr. Co., Dothan, Ala., 10.038 mi. West Carroll Parish $242,625—to F. D. Harvey & Co., Jonesboro, grading, drainage structures 9.81 mi. Sabine Parish $111,700—to Midland Constr. Co., Clarksdale, Miss., 9.551 mi. La Salle and Rapides Parishes $160,801—to Bracklin Constr. Co., Mobile, Ala., 10.568 mi. Union Parish $92,533—to J. G. Newkirk, Roe, Ark., 8.914 mi. Union Parish $91,577—to Wimberly Constr. Co., Arcadia, 9.52 mi. Winn and Natchitoches Parishes $110,505—to National Constr. Co., New Orleans, 7.612 mi. Orleans and Jefferson Parishes $62,573—to R. B. Taylor Co., Louisville, Ky., asphaltic surface treatment on 11.3 mi. roads in St. Bernard and Plaquemines Parishes $57,252; 23.33 mi. Vernon and Rapides Parishes $171,006; 2.93 mi. Calcasieu Parish $25,457—to Frazier Constr. Co., Pittsburgh, Kan., 16 mi. Bienville Parish $92,002—to Franklin Constr. Co., Shreveport, 12.3 mi. Sabine and Natchitoches Parishes $124,622; 13.1 mi. Natchitoches Parish $95,853—to T. L. James & Co., Ruston, 18 mi. Bienville Parish $124,391—to James Stanton Constr. Co., Alexandria, 13.46 mi. Plaquemine Parish

Constr. News page 139

Streets and Roads (Continued)

$103,707; 6.57 mi. Tangipahoa and St. Tammany Parishes $71,472—to T. L. James & Co., Inc., Ruston, amiesite paving 18.1 mi. Avoyelles Parish $273,329—to Nelson Bros., Columbia Mutual Trust Bldg., Memphis, Tenn., 16.75 mi. La Salle and Catahoula Parishes $265,061. Grand total $5,583,948. Noted Feb. 19 and 26 and Mar. 5.

La., Tallulah—Police Jury Madison Parish, gravel surfacing, embankment, culverts 7 mi. Lums-Fortune-Fork-Algadon Rd., Madison Co., to Hennington Bros., Crystal Springs, Miss., $12,244, parish furnishes all material; clearing, grubbing, embankment, culverts, grading 18,000 cu.yd. Lick-Bayou-Indian Rd., 8th Ward, to W. L. and C. E. Powell, Franklinton, $5,038. Noted Feb. 19.

Maine—State Hy. Dpt., Augusta, gravel surfacing 6.69 mi. hy. Palmyra and Newport and grading, base on 2 mi. hy. Newport, to H. T. Smith Express Co., Meriden, Conn., $76,433 and $45,646 respectively—gravel surfacing 0.6 mi. Sullivan and 1.19 mi. Addison and Columbia Falls, to J. R. Cianchette, Pittsfield, $9,347 and $15,489 respectively—gravel surfacing 1.84 mi. Millbridge, to H. J. Cyr, Waterville, $23,030—1.48 mi. Farmington, to R. M. Davis, Old Towne, $17,569. Grand total $187,514.

Maine—State Hy. Dpt., Augusta, gravel surfacing 6.15 mi. hy., Kenduskeag and Corinth, to R. M. Davis, Old Towne, $43,055; bituminous macadam paving 0.9 mi. hy., Norridgewock, to Lewiston Crushed Stone Co., Lewiston, $27,236. Noted Mar. 12.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., 645,261 gal. oil on 146.35 mi. hy. Dists. 3-A and 8, Anne Arundel, Calvert, Charles, Howard, Prince George's and St. Mary's Counties, to E. P. Pendleton, 16 South Calverton Rd., Baltimore, at $0.112 per gal.—99,159 gal. on 44.48 mi. hy. Dists. 1 and 2, Cecil, Dorchester, Kent, Queen Anne's, Talbot, Wicomico and Worcester Counties, to Cooper Bros., Salisbury, $0.0759—98,997 gal. on 41.15 mi. hy. Dists. 3 and 7, Anne Arundel, Montgomery and Prince George's Counties, and 93,386 gal. on 39.35 mi. hy. Dist. 6, Allegheny, Frederick, Garrett and Washington Counties, to Southern Asphalt Co., Richmond, Va., $0.0729 and $0.0812 respectively—81,565 gal. on 36.1 mi. hys. Dist. 5, Carroll, Howard, Frederick and Montgomery Counties, to Lansdale Co., Hackensack, N. J., $0.0725—72,807 gal. on 31.38 mi. hys., Dist. 4, Baltimore and Harford Counties, to Atlantic Refining Co., 260 South Broad St., Phila., Pa., $0.0724. Noted Feb. 26.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete shoulders 2.99 mi. Contr. B-180-411, Baltimore Co., to Development & Contg. Co., Amer. Bldg., Baltimore, $28,190. Noted Feb. 19.

Maryland — State Roads Comn., Baltimore, G. C. Uhl, chn., grading, drainage structures 7 mi. Contr. F.-166-511, Frederick Co., to Fulton Contg. Co., Lancaster, Pa., $40,303. Noted Feb. 26.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., concrete shoulders 7.8 mi. Contr. F-165-611, Frederick Co., to L. R. Waesche & Sons, Thurmont, $74,055. Noted Mar. 12.

Maryland — State Roads Comn., Baltimore, G. C. Uhl, chn., sheet asphalt paving 0.74 mi. Contr. BC-102-74, Baltimore City, to National Paving & Contg. Co., Menlo Dr. and Western Maryland R.R., Baltimore, $63,175; concrete shoulders 0.6 mi. Contr. BC-100-74, Baltimore City, to Caton Contg. Co., Halethorpe, $10,044. Noted Mar. 19.

Maryland—State Roads Comn., Baltimore, concrete shoulders on 10.65 mi. hy. along National Pike from Frostburg towards Grantsville, Allegany and Garrett Counties, to Cumberland Contg. Co., Comberland, $129,219. Noted Feb. 28.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., Baltimore, gravel surfacing 1.75 mi. Contr. P-52-34, Prince George's Co., to L. R. Colbert, Fredericksburg, Va., $8,358; concrete paving 1 mi. Contr. Q-66-24, Queen Co., to P. D. Phillips & Bro., Salisbury, $24,185. Noted Mar. 5.

Md., Baltimore—Bd. Awards, sheet asphalt paving 17,300 sq.yd. streets listed in Contr. 589, to P. Flanigan & Sons, Harford Rd. and Baltimore & Ohio R.R., $57,595. Noted Mar. 12.

Md., Baltimore—Bd. Awards, concrete paving 10,200 sq.yd. streets listed in Contr. 586, to P. E. Rawlings, 2400 Aisquith St., $19,865; sheet asphalt paving 10,800 sq.yd. streets listed in Contr. 587, to Baltimore Asphalt Block & Tile Co., 1320 North Monroe St., $44,599. Noted Mar 5.

Md., Baltimore—Bd. Awards, sheet asphalt paving 9,250 sq.yd. streets listed in Contr. 583, to American Paving & Contg. Co., Montebello Ave., $38,161.

Mass., Marblehead—Hy. Dpt., rebuilding Lee, South, Middle and Washington Sts., day labor, $25,000 or more.

Mass., Newton—Concrete curbing, walks, steps and driveway, to P. J. O'Malley, 82 Masasoit St., Waltham, $38,564.

Mass., Winchester—Metropolitan Dist. Comn., 20 Somerset St., Boston, surfacing South Border Rd., to M. McDonough, Swampscott, $18,590. Noted Mar. 5.

Constr. News page 140

Michigan—A. L. Burridge, div. engr., Cadillac, grading, shaping, drainage structures, concrete paving 2.128 mi. FO24-20C-3, Emmet Co., for State Hy. Comn., Lansing, to Remus Constr. Co., Remus, $55,296 incl. cement. Noted Mar. 5.

Michigan — R. W. Roberts, resident engr., Saginaw, shaping, concrete paving 3.377 mi. FO18-4C-3, Clare Co., 20 ft., for State Hy. Comn., Lansing, to Bartling & Dull, Pontiac, $80,085 incl. cement. Noted Mar. 5.

Michigan—At office Clerk, Muskegon, shaping, concrete paving 1.45 mi. FO61-11-C-5 (Muskegon City), Muskegon Co., to J. R. Edelman Co., Muskegon Heights, $63,021. Noted Feb. 5.

Mich., Bay City—Bay Co. Rd. Comn., shaping, grading, drainage structures, 9 ft. concrete paving 2.5 mi. Portsmouth Rd., to A. J. Rehmus, Bay City, $25,148. Noted Mar. 12.

Mississippi—State Hy. Comn., Jackson, grading, drainage structures several small bridges 13.046 mi. Coahoma Co., to Clark & McCaa, Jackson, $63,835—5.072 mi. Rankin Co., to D. H. Jones, Hattiesburg, $51,954—6.238 mi. Simpson Co., to Shruptine Constr. Co., Canton, $45,845—8.673 mi. Copiah Co., to Brantley & Crowley, Banks, Ala., $78,396—clearing, grubbing, grading, paving 6.525 mi. Hernando-Memphis Rd. and 5.153 mi. Holly Springs-Olive Branch Rd., De Soto Co., to Hartman-Clark Bros., 920 Peoria Life Insurance Bldg., Peoria, Ill., $270,281. Grand total $510,311. Noted Mar. 19.

Mo., St. Louis—Bd. P. Serv., City Hall, rein.-con. paving 1,800 sq.yd. Leone St. and vibrolithic concrete paving 2,300 sq.yd. Connecticut St., to J. F. McMahon Constr. Co., Buder Bldg., $6,520 and $9,312 respectively—3,380 sq.yd. Oriole Ave., to Stiers Bros. Constr. Co., 2944 Magazine St., $18,273—3,695 sq.yd. Rosalie St., to Skrainka Constr. Co., Security Bldg., $14,196—asphaltic concrete paving 1,790 sq.yd. Graham St., to Trinidad Asphalt Mfg. Co., 600 South Theresa St., $17,125—1,750 sq.yd. Park Ave., to Flinn Paving Co., 1405 South 1st St., $14,947—warrenite bitulithic paving 2,200 sq.yd. Wyoming St., and 1,300 sq.yd. Winnebago St., to Granite Bituminous Paving Co., Railway Exch. Bldg., $20,625 and $12,020 respectively—asphalt on concrete paving in conjunction with viaducts on Lindell and Union Blvds., to Bridges Asphalt Paving Co., 1411 Central Industrial St., $109,130. Grand total $222,148. Noted Feb. 19.

Mo., St. Louis—D. P. Leahy and Stedelin Bros., 801 Chestnut St., grading, concrete paving Macklind, Tholozan, Lindenwood, Mardel and Winona Aves., Northampton Park Sub-division, to Perkinson Bros., 3237 Carter Ave., sewers, to Ansbro & McGuire, Title Guaranty Bldg.

Nebraska—R. L. Cochran, engr., State Hy. Comn., Lincoln, to Western Asphalt Paving Co., 2100 East 4th St., Sioux City, Ia., paving 10.3 mi. Cass and Otoe Counties, $306,880; 4.2 mi. Saunders Co. $177,067; 3 mi. Sarpy Co. $116,-210; 4.2 mi. Sarpy Co. $103,183; 10.9 mi. Lincoln Co. $199,696—to Einung Bros., Nebraska City, graveling 3.8 mi. Otoe Co. $2,783—to A. I. Cram, Burwell, 13.6 mi. Wheeler Co. $24,357; 5 mi. Wheeler Co. $10,005; 4 mi. Greeley Co. $5,939; 7.3 mi. Valley Co. $9,186—to Koehler Constr. Co., Sterling, 10 mi. Dundy Co. $9,518; 5.1 mi. Thomas Co. $3,113; 9.6 mi. Blaine Co. $8,761; 7.9 mi. Brown-Cherry Co. $9,166—to Allied Contractors, Inc., 1803 Douglas St., Omaha, 4.4 mi. Custer and Logan Counties, $4,697—to Jensen Constr. Co., Kimballton, Ia., bridge in Washington Co. $10,519; culvert same road $8,999—to Diamond Eng. Co., Grand Island, bridge Saunders Co. $33,706; viaduct Saunders Co., $22,880; bridge Sarpy and Saunders Counties $144,222; paving 8.4 mi. Merrick Co. $153,949; 3.1 mi. Hall Co. $68,750—to Abel Constr. Co., 308 Terminal St., Lincoln, graveling 2.9 mi. Cass Co. $5,803; 5.5 mi. Sarpy Co., $2,406—to Roberts Constr. Co., 404 1st Natl. Bank Bldg., 4.5 mi. Cass Co. $8,524; 4.6 mi. Gosper Co. $5,911; 5.6 mi. Howard and Greeley Counties $9,731—to H. J. Petersen Co., 407 Merchant Natl. Bank Bldg., Omaha, bridge repairs Sarpy Co. $1,817—to Yant Constr. Co., 1146 Omaha Natl. Bank Bldg., Omaha, grading 3.1 mi. Saline and Fillmore Counties $2,181; 8 mi. Saline Co. $20,491—to L. G. Crownover, Lincoln, 9.3 mi. Dawes Co., $10,129—to Murphy Gravel Co., Fremont, 19 mi. Nance Co., $17,213—to Weaver Lunger, Gibbon, 8.5 mi. Dawson Co. $8,821—to P. Sawyer, Goldridge, 6.2 mi. Phelps Co. $10,131; 8.1 mi. Harlan Co. $13,212; 9.3 mi. Harlan Co. $11,349—to R. C. Haas, Lexington, 8.1 mi. Dawson Co. $3,366. Grand total $1,564,737. Noted Feb. 19.

Neb., Wausau—Grading, curbing, rein.-con. paving 2 mi. streets, to Booth & Olson, 318 Grain Exch. Bldg., Sioux City, Ia., $55,314. Noted Mar. 19 Daily.

New Jersey—State Hy. Comn., Trenton, rein.-con. paving Route 22, Sect. 1, North Ave. to South Ave., Cranford, Union Co., to Nutley Constr. Co., Nutley, $31,636. Noted Mar. 5.

N. J., Cliffside Park—Bd. Boro Council, Boro Hall, grading, sheet asphalt on concrete paving Prospect, Rothwell and Riverview Aves., to Copoletta Bros., 452 Palisade Ave., $38,690. Noted Mar. 21.

New York—Taconic State Park Comn., 25 Market St., Poughkeepsie, grading, drainage, structures, on Sect. 1, Part 1, Western State Parkway from Westchester-Putnam Co. line to New Hill Rd., Putnam Co., to A. Tomasso, 410 Commonwealth Ave., New Britain, Conn., $93,877. Noted Mar. 5.

N. Y., New York—S. Levy, pres. Manhattan Boro Municipal Bldg., sidewalks, curbing, to Meehan Paving & Constr. Co., 90 West St., $16,990. Noted Mar. 5.

O., Dayton—Montgomery Co., Court House furnishing, applying 850,000 sq.yd. tar treatment and 100,000 sq.yd. asphalt penetration treatment on 100 mi. roads, to H. W. Curry & Co., Eaton, $38,900. Est. $65,000. Noted Mar. 12.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, drainage structures 5.038 mi. Federal Aid Project 216-A west of Snyder, Kiowa Co., 32 ft. to T. C. Ottinger, Hinton, $16,978. Est. $25,000.

Ore., Portland—Multnomah Co., Court House, concrete resurfacing 7,900 ft. Baker Rd., 22 ft. to Jacobsen-Jenson Co., 407 Stanton St. $33,418.

Pa., Phila.—Bureau of Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., Schedule B, curbing and footway work (city to pay) 1st and 2nd Hy. Dists., to S. Aversa, 731 Watkins St., $1,921 and $1,442 respectively—Schedule C, furnishing, delivering coarse aggregate (crushed stone or pebbles) and Schedule D, furnishing, delivering ready mixed Portland cement concrete to Warren Co., 1616 Walnut St., $4,770 and $816 respectively—Schedule E, furnishing, delivering high early strength Portland cement, to Lone Star Cement Co., 225 South 15th St., $9,275—Schedule F, furnishing, delivering concrete sand, to J. F. Nolan & Sons, Pennsylvania St. and Bedford Ave., $2,500—Schedule G, insulating steel tank, to J. J. McHugh, 1617 Race St., $1,473—Schedule H furnishing street designation signs, to Baily-Davis Corp., 16 South Broad St., $639. Grand total $22,836. Noted Mar. 5.

Pa., Phila.—Bureau Hys. Dpt. P. Wks., City Hall Annex, A. Murdock, dir., Schedule A, grading H St. from Ramona to Cayuga Sts. and Whitaker St. from Erie to Luzerne Sts., to McCarrick Bros., 3240 Fox St. $9,128—Schedule B, reconstructing and repaving deck of Walnut St. Bridge over Schuylkill River, to M. and J. B. McHugh, 892 North Market St., $33,275—Schedule C, country road improvement Cheltenham St. from Weymouth to Newton Sts., to Union Paving Co., Broad and Stiles Sts., $1,990—Schedule D, concrete paving Upsur St. from New Market St. to point 173 ft. east, to Atlas Paving Co., 317 South 6th St., $7,267—Schedule E, repairs to fender Passyunk Avenue Bridge over Schuylkill River, to Latta & Roberts, 520 Drexell Bldg., $4,285—Schedule F, furnishing, applying bituminous material (dust laying oil), to Atlantic Ref. Co., 260 South Broad St., $5,760. Grand total $191,705. Noted Mar. 12.

R. I., East Providence—Town Council, curbing, granite block and bituminous macadam paving, to J. McCormick, East Providence. Est. exceeds $25,000. Noted Mar. 12.

Tex., Beaumont—Natural rock asphalt on concrete paving Center, Corley, Ector, 1st and Pine Sts., to S. Shambaugh, 1401 Dowling St., Houston, $81,766.

Tex., Brownsville—City, c/o R. B. Renfro, mayor, curbing, guttering, 2 in. bitulithic and 6 in. concrete paving 9,000 sq.yd. Lincoln, Ebony Sts., to Southwest Bitulithic Co. & G. Hamilnek, Corpus Christi. Est. $25,000. Noted Feb. 19.

Tex., Dallas—For 6 in. rein.-con. paving Watkins, Longview, Hendricks, Rockwood and Mont Clair Sts., to Wallace Bros. & Bowden, Dallas, $36,590. Noted Mar. 5.

Tex., Galveston—City, c/o F. A. Quin, aud., concrete curbing permanent paving, drainage structures 28,500 sq.yd., and constructing drain down 33rd St., to Broussard-Warfield Co., Beaumont, $78,915 and $71,302 respectively. Noted Mar. 5.

Tex., Wharton—City, c/o J. Blair, secy., improving Richmond Rd., to Russ Mitchell, Inc., Petroleum Bldg., Houston, $36,424.

Utah—State Rd., Comn., Salt Lake City, oil processing 66.5 mi. State Hys., Kane and Washington Counties, to J. C. Compton, McMinnville, Ore., $154,945. Est. $148,365. Noted Mar. 11 Daily.

Utah—State Rd. Comn., Salt Lake City, grading, surfacing 8.735 mi. Dixie Hy., between Cedar City and Winn Hollow, Inn Co., to Wheelwright Constr. Co., Ogden, $76,499. Est. $79,345. Noted Mar. 11 Daily.

Wash., Pomeroy—Garfield Co., grading, draining, surfacing 4.75 mi. Lateral Hy. 3, to J. W. Poe, Lewiston, Idaho, $30,670. Est. $35,000.

Wash., Seattle—King Co., concrete paving 1 mi. Orilla Rd., to Erickson Paving Co., 1550 North 34th St., $32,028. Est. $28,700. Noted Mar. 5.

Wash., Wenatchee—Chelan Co., grading, surfacing 1.5 mi. South Lake Shore Rd., to Goodfellow Bros., Wenatchee, $28,594. Noted Mar. 9 Daily.

Wash., Yakima—Yakima Co., concrete paving 16th Ave. S., to Midstate Constr. Co., Yakima, $32,031. Noted Feb. 5.

Wis., Chilton—Calumet Co., grading, draining 3 mi. Jericho-New Holstein Rd., to C. F. Wussow, 1067 39th St., Milwaukee, $18,506. Noted Mar. 6.

Wis., Kenosha—Grading, sidewalks, rein.-con. paving 36,600 sq.yd. 7th Ave., 8th, 30th, 33rd, 45th, 52nd, 55th, 71st and 74th Sts., to A. E. Bounsall Kenosha, $73,341.

Wis., Whitefish Bay—To W. F. Hunt, 445 Bway., Milwaukee, concrete paving North Lydell Ave. at $1.59 per sq.yd.; North Berkeley Blvd. $1.62; North Island Ave. $1.62; North Avoca Ave. $1.59; East Courtland Pl. $1.65; North Ardmore Ave. $1.62; North Wildwood Ave. $1.62; North Lake Dr. $1.97; paving North Richards St. at $1.78 per sq.yd.; grading same

Streets and Roads (Continued)

street $0.20; North Hollywood Ave. $0.29, paving same street $1.59; alley in Block 10 $1.43, grading same alley $0.35; Blocks 1 and 2 $0.34, paving same $1.43; grading West Monrovia Ave. $0.29—to Northwest Grading Co., 64th and Beloit Sts., Milwaukee, grading East Courtland Pl. $0.27—to A. Reichard, 706 Lefever Ave., Wauwatosa, sidewalks on North Berkeley Blvd. at $0.134 per sq.ft.; North Island Ave. $0.134; North Montclair Ave. $0.134; West Monrovia Ave. $0.134; West Birch Ave. $0.134; North Weil St. $0.146; East Lancaster Ave. $0.145; East Courtland Pl. $0.134; North Hollywood Ave. $0.134; North Ardmore St. $0.134; North Wildwood St. $0.134; North Humboldt St. $0.134; East Lancaster St. $0.134; and North Berkeley St. $0.134—to N. Harris, 820 Main St., East Hampton Ave., $0.164. Noted Mar. 11 Daily.

B. C., Vancouver—Curbing 6 and 7 in. concrete paving to Vancouver Pile Driving Co., Ltd., 207 Hastings St. W., $51,775—to Hodgson, King & Marble, 626 Pender St. W., $6,159—to G. W. Ledingham, 348 East 8th Ave., $11,712. Grand total $69,646. Est. $70,000.

Ontario—R. M. Smith, deputy minister Dpt. Hys., Parliament Bldgs., Toronto, mixed macadam paving 6.27 mi. hy. from Smiths Falls southerly. Contr. 31-18, to M. G. Henninger Smiths Falls; 7 mi. Ashton to Carleton Pl., to Dibble Constr. Co., Toronto. Noted Feb. 5.

The quick and resourceful reporting service, vigilant and fair, whether in boom or depression, furnishing daily the exact data you need for making contacts and developing markets — CONSTRUCTION DAILY, 10th Ave. at 36th St., New York.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Ind., Angola—Bd. Comrs. Steuben Co. David Haskins Drain. $25,000. D. Gilbert, Angola, engr.

Ind., Shelbyville—See "Power Plants."

Tex., Pharr—Pharr-San Juan Irrigation Dist., Hidalgo Co., soon takes bids 8 mi. drainage ditch, 24 ft. wide, 8 ft. deep. $25,000. E. M. Mard, Pharr, co. engr.

BIDS ASKED

Calif., San Francisco—H. A. Minton, archt., 525 Market St., taking bids 170,000 cu.yd. excav., in connection with proposed college for women, for Roman Catholic Archbishop, 1100 Franklin St.

Calif., Turlock—Apr. 13, by A. Sorenson, secy., Turlock Irrigation Dist., 20,244 sq.ft. 2 in. concrete canal lining, miscellaneous concrete structures in Dist. 43; 17,670 sq.ft. 2 in. concrete canal lining, miscellaneous concrete structures, Dist. 29.

Nebraska—Apr. 11, at office W. C. Frampton, secy., Lancaster Co. Sanitary Dist. 1, 427 Bankers Life Bldg., widening, deepening Southeast Sect. 31-11-7, and Northeast Sect. 6-10-7, in Salt Creek, incl. 335,735 cu.yd. dredging in channel, 483 cu.yd. side ditch excavating, Scott & Scott, 427 Bankers Life Bldg., engrs.

O., Canton—City, Bd. Control bids about May 17, ¼ mi. concrete retaining wall along East Creek in 11th St. N. E. $28,165. W. E. Sarver, City Hall, engr.

B. C., Ladner—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Brookline—Town, excavation, water pipe trenches, in Grove, Chilton and Churchill Sts., to B. F. Quimby, 854 Hammond St. Est. $15,000 or more.

Pa., Phila.—See "Buildings—Unclassified."

B. C., Ladner—Provincial Govt., Victoria, 700 ft. timber pile ferry landing, 12 ft. wide with steel gangway, day labor. $25,000. P. Philip, Dpt. P. Wks., Victoria, engr.

Bond Elections

Coming Bond Elections

Wells, Pumping Equipment, Tanks, etc.— Ia., Dallas Centre, Apr. 16. $66,000.

Waterworks—Kan., Collyer, Apr. 6. $24,500.

Waterworks—Kan., Le Roy, Apr. 6. $36,000. E. T. Archer & Co., Kansas City Engrs.

Waterworks—Kan., Fulton, April 6. $20,000. E. T. Archer & Co., Kansas City Engrs.

Impounding Dam, Reservoir, Mains — Kan., Olathe, Apr. 7. E. T. Archer & Co., Kansas City, Engrs.

Filtration Plant — Mont., Forsythe, Apr. 6. $60,000.

Sewers—Calif., Oakland, $1,300,000. W. Frickstadt, City Engr.

Sewage Disposal Plant—Mont., Kalispell, June 2. $100,000.

Sewage Disposal Plant—Okla., Wewoka, May 5. $45,000. R. Grace, Engr.

Park and Recreational Facilities—Calif., Oakland, $800,000.

Library, Museum Hospital — Calif., Oakland, $1,300,000.

High School—Calif., Los Banos, $175,000.

Senior and Grammar School—Tex., San Marcos, Apr. 7. $200,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Minn., Fort Snelling—HOSPITAL—Vet. Bu., Arlington Bldg., rein.-con., brick, stone addition. $275,000.

Montana—PIPE LINE—Nat. Park Serv., Wash., D. C., 3 mi. pipe line to entrance monument at Craters of the Moon National Monument. $28,000.

N. Y., Stapleton (mail Staten Island)—HOSPITAL—Treas. Dpt. at office Sup. Archt., plans by R. M. Murchison & W. H. Gompert, 101 Park Ave., marine hospital. $2,500,000.

S. C., Parris Island — PAVEMENT — Spec. 6463—Yards & Docks, cement paving.

Tex., Houston — DREDGING — U. S. Eng. Galveston, 4,740,300 cu.yd. Houston Ship Channel.

China, Shanghai—EMBASSY — Dpt. State, Foreign Buildings Office, bids probably late in April, government building. $600,000. Noted Feb. 21.

BIDS ASKED

Ala., Decatur—POST OFFICE—Apr. 23, by Treas. Dpt. at office Sup. Archt., remodeling, enlarging U. S. Post Office; adv. E. N.-R. Apr. 2.

California—ROAD—Apr. 16, by C. H. Sweetser, dist. engr., Pub. Rds. 461 Market St., San Francisco, grading 9.913 mi. Sect. A, Route 10, Weed-Medicine Lake Natl. Forest Hy., Siskiyou Co.

Conn., Niantic—WAREHOUSE, etc.—Apr. 15, by Property & Disbursing Officer, State Armory, Hartford, warehouse, 6 kitchens, mess hall.

D. C., Wash.—HYDRAULIC LABORATORY—Apr. 7, by Bureau Standards, hydraulic laboratory; Apr. 10, 9 sluice gates, $350,000.

Ill., Chicago — DREDGING — Apr. 11, by U. S. Eng., 258,600 cu.yd. from Indiana Harbor Canal.

Ind., New Albany—POST OFFICE—Apr. 6, by Treas. Dpt. at office Sup. Archt., enlarging U. S. Post Office.

Ky., Louisville—POST OFFICE—Treas. Dpt. at office Sup. Archt. bids from May 1 to 30, superstructure post office, 6th St. and Bway. $2,000,000. Noted Nov. 13.

Louisiana—EARTHWORK—Apr. 21, by U. S. Eng. Prytania and River Sts., New Orleans, 8,000,000 cu.yd. in 2nd New Orleans Levee Dist.; Columbia Levee, Item R 930, 300,000 cu.yd. in Mississippi River, and Carroll Levee, Item R-928, 360,000 cu.yd., both in Lafourche Levee Dist.; College Point Levee, 90,000 cu.yd. and Bowden Levee, 175,000 cu.yd., both in Pontchartrain Levee Dist.; Collette New Levee, 30,000 cu.yd. Lake Borgne Levee Dist., all foregoing in 2nd Orleans Dist.

Louisiana—LEVEE—Apr. 21, by U. S. Eng., New Orleans, 145,000 cu.yd. in New Monsecour Levee on Mississippi River, 150,000 cu.yd. in New Fairview Levee, 50,000 cu.yd. in Pecan Grove Levee, all foregoing in Lake Borgne Levee Dist.; Picayuneville Levee, 1,345,000 cu.yd. new levee and 275,000 cu.yd. enlargement in Picayuneville Levee New, 450,000 cu.yd. Lower Maurganza Levee enlargement, all foregoing in Atchafalaya Levee Dist.; 865,000 cu.yd. new and 1,055,000 cu.yd. levee enlargement in Plaquemine Point Levee, 150,000 cu.yd. New Oneida Levee, 565,000 cu.yd. New Garyville-Reserve Levee Dist., all foregoing in Pontchartrain Levee Dist.; 665,000 cu.yd. Elkridge-White Oak Levee Enlargement, Lower Tensas Levee Dist.

Me., Portland — ELEVATOR — Apr. 17, by Treas. Dpt. at office Sup. Archt., elevator plant in court house extension.

Mass., Boston—ELECTRIC FURNACE—Apr. 7, by Yards & Docks, Navy Dpt., lumber and electric furnace to Boston Navy Yard.

Mass., Springfield—POWER PLANT—Apr. 21, by Con. Q.M., Springfield Armory, replacing steam boiler plant, incl. altering existing boiler plant building, providing support for dust collection equipment, erecting chimney, installing oil burning plant, at Hill Shops, Springfield Armory. $105,000. Noted Mar. 26.

Mass., Springfield—ROAD—Apr. 7, by Commanding Officer, Armory, concrete or tar bound macadam paving road in armory grounds.

N. J., Camden—POST OFFICE, etc.—Apr. 9, by Treas. Dpt. at office Super. Archt., U. S. Post Office, court house. Former bids rejected; adv. E. N.-R. Apr. 2. Noted Feb. 5.

N. J., Hoboken—POST OFFICE—Apr. 20, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

N. Y., Brooklyn—MOTOR GENERATOR—Apr. 14, by Signal Supply Officer, Sig. Sect. New York General Depot, Army Base, motor generator.

N. Y., Brooklyn—WIRE—Apr. 24, by Signal Supply Officer, Sig. Sect., New York General Depot, Army Base, wire, anchor, etc.

N. Y., Governors Island (br. New York)—BARRACKS—Apr. 30, by at office Con. Q.M., 39 Whitehall St., New York, detachment barracks, Fort Jay; adv. E. N.-R. Apr. 2.

Okla., Shawnee—INFIRMARY—Apr. 18, by Commissioner Indian Affairs, Dpt. Interior, infirmary building at Shawnee Sanatorium.

S. C., Charleston—PIER—Apr. 23, at office U. S. Eng., furnishing, repairing south pier of U. S. Engineer Wharf; adv. E. N.-R. Apr. 2.

South Dakota—OPEN DRAINS, etc.—Spec. 520—Apr. 22, by Bureau Reclamation, Newell, 43 mi. open drains, drainage structures, on Belle Fourche Project, E. Mead constr. adv. E. N.-R. Apr. 2.

Tex., El Paso—POST OFFICE—Apr. 10, by Treas. Dpt. at office Sup. Archt., 3 story, basement, 87 x 104 ft., brick, steel post office, $350,000.

Utah—ROAD—Apr. 9, by Pub. Rds. Coolen, grading, draining, rein.-con. paving 11.726 mi. Sevier-Cove Fort Natl. Forest Rd., Sevier Co. B. J. Finch, 403 Kiesel Bldg., Ogden, dist. engr.

Utah, Salt Lake City—HOSPITAL—Apr. 30, by U. S. Eng., constructing, finishing U. S. Veterans Hospital, incl. 1 main building, 1 garage and attendants quarters, roads, walks, drainage, grading; adv. E. N.-R. Apr. 2. Noted Oct. 30.

Virginia—OPERATING MACHINERY—Apr. 14, by U. S. Eng. Norfolk, gate and valve operating machinery for Guard Lock in Inland Waterway at Great Bridge; adv. E. N.-R. Apr. 2.

Va., Fort Humphreys—HOSPITAL—Apr. 23, at office Con. Q.M., hospital; adv. E. N.-R. Apr. 2.

Va., Langley Field—WAREHOUSES, etc.—Apr. 30, at office Con. Q.M., 2 air corps warehouses; adv. E.N.-R. Apr. 2.

Va., Yorktown—WELL—Apr. 6, by O. G. Taylor, engr. in charge, Colonial Natl. Monument, 1 m.g. gravel-wall well, and installing motor driven turbine pump, well equipment, and 10,000 gal. pressure tank.

Vt., Rutland—ELEVATOR—Apr. 16, by Treas. Dpt. at office Sup. Archt., installing 1 passenger elevator in U. S. Post Office and Court House.

Wyoming—ROAD—Apr. 7, by Pub. Rds., Custom House Bldg., Denver, Colo., grading, draining, surfacing 9.695 mi. Aladdin-Hulett Natl. Forest Hy., Black Hills Natl. Forest, Crook Co. A. E. Palen, dist. engr.

Alaska—ROAD—Apr. 9, by M. D. Williams, dist. engr., Pub. Rds., Juneau, grading, grubbing, clearing, graveling 2.78 mi. Petersburg-Creek Hy., adjacent to Tongas Natl. Forest, Juneau Co.

CONTRACTS AWARDED

Arkansas—LEVEE—U. S. Eng., P. O. Box 667, Vicksburg, Miss., to Clarke Bros. Constr. Co., Wolfe Bldg., Clinton, Ia., 950,000 cu.yd. in Redfork New Levee, south bank Arkansas River $199,500, 600,000 cu.yd. in Mckenuon Levee Enlargement $132,000, 560,000 cu.yd. Medford New Levee $117,600, 375,000 cu.yd. Davis Lake $56,250; to Canal Constr. Co., McCall Bldg., Memphis, Tenn., 375,000 cu.yd. Medford Levee Englargement, $105,750; to R. A. Stevenson, Box 636, Dumas, 155,000 cu.yd. Pendleton Enlargement, $30,101. Grand total $641,201. Noted Feb. 19.

Ariz., Casa Grande—BEACONS, etc.—Con. Q.M., 3 airplane beacons and 16 mi. transmission line from Picacho to air landing field 2 mi. from Redrock, to J. W. White, Casa Grande, $14,000.

California—ROAD—C. H. Sweetser, dist. engr. Pub. Rds., San Francisco, Calif., grading 10 mi. Sect. A, Route 11, Lava Beds Natl. Forest Hy., Modoc Co., to Larsen Bros., Galt, $89,075. Noted Feb. 19.

Florida and Virginia—BEACON LIGHTS—Dpt. Commerce, Aeronautics Branch, Wash., D. C., twenty 24 in. electric revolving beacons and 1 electric code beacon, together with necessary appurtenances, accessories along Florence-Richmond Sect., Jacksonville-Richmond Airway which constitutes distance of 260 mi., to R. H. Boulizny, Inc., 27 West 1st St., Charlotte, N. C., $24,711.

Idaho, Caldwell—POST OFFICE—Treas. Dpt. at office Sup. Archt., general contract U. S. Post Office, to W. Petersen, 309 Wilkinson Bldg., Omaha, Neb., $73,719. Noted Jan. 29.

Illinois—DIKES—U. S. Eng., St. Louis, Mo., 3,000 ft. piling dikes at Union Point and Hanging Dog Island, to Badgett Constr. Co., Caruthersville, Mo., $131,700; 2,500 ft. piling dikes at Giboney Island, to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, Neb., $111,688; 2,000 ft. piling dikes at Burnham Island and Goose Island, Towhead, to Patton-Tully Transportation Co., Memphis, Tenn., $89,725. Grand total $333,113. Noted Feb. 5.

Ill., Belleville—QUARTERS—Con. Q.M., 8 double sets non-commissioned officers quarters, to C. Westberg & Co., 6234 South Oakley Ave., Chicago, $111,919; 2 story, 76 x 95 ft. barracks, to Morley Constr. Co., 1643 Belleview Ave., Kansas City, Mo., $104,040. Noted Feb. 19.

Ind., Indianapolis—ELEVATOR—Vet. Bu., Arlington Bldg., elevator in U. S. Veterans Hospital, to Warner Elevator Mfg. Co., 2613-31 Spring Grove Ave., Cincinnati, O., $16,135.

La., Shreveport—SEWERS, etc.—Con. Q.M., sewer, and water-mains at Barksdale Field, to W. H. O'Toole, Monroe, $33,800. Noted Mar. 5.

Mass., Boston—POST OFFICE—Treas. Dpt. at office Sup. Archt., granite, to N. P. Severin, 222 West Adams St., Chicago, Ill., $4,648,000. Noted Mar. 19.

Mass., Lawrence—POST OFFICE—Treas. Dpt. at office Sup. Archt., 2 story, basement, 135 x 140 ft., stone, to E. E. Munroe, 62 Spring St., Plainville, $118,000. Noted Mar. 26.

Michigan—DREDGING—U. S. Eng., Detroit, deepening Course 16, Rock Cut West Neebish Channel St. Mary's River, to Connolly Contg. Co., 2234 University Ave., St. Paul, Minn., $790,415. Noted Feb. 5.

Minn., Duluth—DREDGING—U. S. Eng., dredging, to Duluth Superior Dredge Co., 46th Ave. W. Est. $156,000-$210,000. Noted Feb. 26.

Constr. News page 141

Federal Government (Continued)

Mississippi—LEVEE—U. S. Eng., Vicksburg, 682,476 cu.yd. earthwork in Warfield-Refuge Levee Enlargement, east bank Mississippi River, to C. C. Aderholdt, Memphis, Tenn., $151,032; 446,600 cu.yd. Ashwood Tarpley Levee Sect. 2, and 706,000 cu.yd. in Greenville Front Levee Enlargement, to Canal Constr. Co., McCall Bldg., Memphis, Tenn., $119,242 and $197,327 respectively; 1,215,664 cu.yd. on Dennis Levee Enlargement and new levee, to E. F. Powers Constr. Co., 318 Harvey Bldg., West Palm Beach, Fla., $235,839. Grand total $703,440. Noted Feb. 19.

Missouri—DIKES—U. S. Eng., 428 Custom House, St. Louis, 5,000 ft. piling dikes at Cora Island, to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, Neb., $261,196; 7,700 ft. piling dikes at Augusta Bend, to **Massman** Constr. Co., Amer. Bank Bldg., **Kansas City**, $345,057. Noted Jan. 15.

N. J., Trenton—GRADING and FOUNDATIONS—Treas. Dpt. at office Sup. Archt., grading and found. for U. S. Post Office, to R. S. Herzog, 10 South 18th St., Phila., Pa., $35,145. Noted Mar. 12.

N. Y., Brooklyn—POWER PLANT—Yards & Docks, Navy Dpt., power plant addition, incl. turbo alternator at Brooklyn Navy Yard, to Moore Steam Turbine Co., Wellsville, $30,000. Noted Feb. 19.

N. Y., Buffalo—BREAKWATER—U. S. Eng., Federal Bldg., repairing 1,699 lin.ft. concrete banquet on old section breakwater Buffalo Harbor, to F. W. Paulin Constr. Co., Ellicott Sq., $45,934. Noted Mar. 5.

N. Y., Buffalo—DREDGING—U. S. Eng., 355,000 cu.yd. sand, clay and mud from Areas H. I and K, in outer harbor, to Great Lakes Dredge Co., Morgan Bldg., $84,272. Noted Jan. 29.

Oregon—ROAD—Pub. Rds., grading, draining, 6.671 mi. John Day-Hy., Umatilla Co., to A. C. Peck & Co., Harper, metal pipe $97,540.

Pa., Phila—SEA WALL—Spec. 6417—Yards & Docks, Navy Dpt., extending seawall at Naval Aircraft Station, to Triest & Earle, Real Estate Trust Bldg.

Pa., Phila. — TURBO-ALTERNATOR — Spec. 6392—Yards & Docks, Navy Dpt., turbo-alternator, to Elliott Co., Lexington Bldg., Baltimore, Md., $49,880.

R. I., Melville—CHIMNEY—Spec. 6290—Yards & Docks, Navy Dpt., 100 ft. radial brick chimney, to H. R. Heinicke Corp., 221 South Jersey St., Indianapolis, Ind., $2,785. Noted Mar. 5.

R. I., Warren—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to T. Perrone, Inc., 1026 Main St., Hartford, Conn. Noted Mar. 16 Daily.

Tenn., Memphis—EARTHWORK—U. S. Eng., 322,000 cu.yd. earthwork in Lower St. Francis Levee Dist., near Stewart Mo., to Rodgers, Jones & Uzzelle, 62 South Front St., Memphis, at $0.2328 per cu.yd. (100 days). Noted Mar. 5.

Tex., Randolph Field—DISTRIBUTION SYSTEM—Con. Q.M., electric distribution system, to Collier Constr. Co., 500 East 102nd St., Cleveland, O., $47,800. Noted Feb. 19.

Va., Hampton Roads—HANGAR—Spec. 6405—Yards & Docks, Navy Dpt., 160 x 203 ft. extension to hangar and shop building, to R. R. Richardson & Co., North Bank Commerce Bldg., Norfolk, $82,697. Noted Feb. 19.

RAILWAYS

PROPOSED WORK

California—Market Street Ry. Co., 58 Sutter St., San Francisco, electric railway from Turk and Divisadero Sts. to Balboa St., thence to point between 30th and 31st Aves., to serve Richmond Dist. in San Francisco. $400,000.

Illinois—Illinois Central R.R. Co., 135 East 11th Pl., Chicago, A. F. Blaess, ch. engr., rebuilding 1 and 2 story, rein.-con. freight station, on 45 x 1,040 ft. site Front St., in East St. Louis, recently destroyed by fire. $300,000.

CONTRACTS AWARDED

Ontario—Canadian Natl. Ry., C. S. Gzowski, ch. engr., Montreal, Que., construction work for Canadian Natl. Ry. cut-off at West Fort William, to Chambers, McCaffery & McQuigge, Port Arthur, $300,000.

SUBWAYS AND TUNNELS

BIDS ASKED

Mich., East Lansing—Apr. 9, by H. H. Halladay, secy. Michigan State College, concrete lined tunnel, steam fitting, plumbing, electric wiring for steam tunnel at college. $25,000. Bowd-Munson Co., 409 Wilson Bldg., Lansing, archts.

CONTRACTS AWARDED

Pa., Phila.—Dpt. City Transit, C. E. Myers, dir., City Hall Annex, 1,087 lin.ft. 4 track subway under Market St. from 30th to 32nd Sts., also 1 passenger station. Contr. 262, to Keystone State Corp., Philadelphia Bank Bldg., $1,578,145. Noted Feb. 26.

GRADE CROSSINGS

PROPOSED WORK

Ind., Ft. Wayne—City and New York, Chicago & St. Louis R.R., O. Pierce, div. supt., (Nickel Plate Dist.) grade crossing at Clay St. $400,000.

Constr. News page 142

Mass., Cheshire—Commonwealth of Massachusetts, Dpt. P. Wks., Boston, Town, and New York Central R.R. Co., F. B. Freeman, 466 Lexington Ave., New York, ch. engr. (lines Buffalo and East) grade crossing, overpass, state hy. Reservoir Rd. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., Northbridge—Commonwealth of Massachusetts, Dpt. P. Wks., State House Boston, Town, and New York, New Haven & Hartford R.R., E. E. Oviatt, ch. engr., New Haven, Conn., grade crossing-overpass — Rockdale Crossing, Town Way. $140,000. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., Winchendon—Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, Town, and Boston & Maine R.R. Co., W. J. Backes, ch. engr., Boston, grade crossing, town way, overpass, Pequoig Crossing., $50,000. A. W. Dean, Dpt. P. Wks., Boston, engr.

O., Ravenna—Portage Co. steel, concrete overpass over Baltimore & Ohio R.R. on Route 14, 2 mi. south of here. $125,000.

BIDS ASKED

Ill., Chicago—Apr. 8, by City, City Hall, North State Street Viaduct, Wabash Avenue Connection. R. W. Wolfe, comr. Dpt. P. Wks.

New York—Apr. 15, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, stone faced rein.-con. undercrossing, at Bedford Rd. and two river bridges on Saw Mill River Parkway, village of Pleasantville and Mount Pleasant, J. Downer, Bronxville, ch. engr.; adv. E.N.-R. Apr. 2.

CONTRACTS AWARDED

Ind., Indianapolis—City, Marion Co., and Indianapolis Union Ry. Co., Chicago, Ill., 2 overhead bridges over railroad at South Meridian St. and Bluff Rd., to Cunningham Constr. Co., Old Trails Bldg., $57,753. Est. $70,000.

Tex., Amarillo—Chicago, Rock Island & Pacific Ry. Co., c/o W. H. Petersen, ch. engr., Chicago, Ill., and Fort Worth & Denver City Ry. Co., R. C. Gowdy, ch. engr., Denver, Colo., constructing 160 ft. long rein.-con. subway, 34 ft. wide, concreted wing approaches, North Fillmore St., incl. 550,000 lb. reinforced steel, to Sheffield Steel Corp., Sheffield St., Kansas City, Mo., $11,500; 800 ft. 18 in. sewer pipe, to Clowe & Cowan, Inc., 401 Harrison St., Amarillo, $1,687; cement, to Panhandle Lumber Co. and Amarillo Lumber Co., Amarillo, $17,150; sand and gravel, to Western Sand & Gravel Co., 916 Tyler St., and Texas Sand & Gravel Co., Amarillo, $14,442. Grand total $44,779. Noted Jan. 8

DAMS

PROPOSED WORK

Colo., Pueblo—See "Hospitals."

Ind., Shelbyville—See "Power Plants."

PIERS AND WHARVES

PROPOSED WORK

Calif., San Francisco—PIER EXTENSION—State of California (Harbor Comn.) Ferry Bldg., 600 ft. pier extension, at Pier 50. F. G. White, Ferry Bldg., engr.

CONTRACTS AWARDED

Mass., Boston—Park Dpt., repairs, replacements at Marine Park Piers, South Boston, to Marine Co., 173 Summer St., $66,979.

AIRPORTS

PROPOSED WORK

Conn., Hartford—Chamber of Commerce, J. B. Slimmon, chn. Aviation Com., 100 x 120 ft. hangar, Brainard Field. $35,000. Private plans. Interstate Airways, Inc., Chamber of Commerce, lessee.

Mass., Grafton — City, Worcester Airport Comn., retained Austin Co., engrs., 120 Bway., New York, to prepare preliminary surveys, new airport. To exceed $25,000.

N. H., Newport—Town, H. E. Jameson, clk., airport, incl. steel hangar. $55,000.

N. Y., Mountain Lakes—Affiliated Country Clubs, Inc., 9 East 45th St., New York, flying field, golf course, earth dam. Sullivan Co. $40,000.

BIDS ASKED

Fla., Jacksonville—Apr. 8, by City Comn., M. W. Bishop, secy., 40 x 50 ft. airplane hangar at Municipal Airport.

Miss., Laurel—Apr. 6, by Common Council, hangar, 8,000 sq.ft., workshops and office, 2,000 sq.ft., also 1,400 sq.yd. 4 in. 1:2:4 concrete.

Wash., Seattle—Comrs. King Co., bids about Mar. 31, airplane hangar, at Boeing Field, $80,000. T. D. Hunt, Seattle, co. engr. Noted Nov. 6.

GRAIN ELEVATORS

PROPOSED WORK

Kan., Junction City—GRAIN ELEVATOR—Hogan Milling Co., preliminary plans 40 x 111 ft. grain elevator. $50,000. Horner & Wyatt, 468 Bd. of Trade Bldg., Kansas City, Mo., engrs.

Kan., Junction City—GRAIN ELEVATOR—City Comn. 40 x 111 ft. grain elevator, 250,000 gal. capacity, incl. 11 tanks, 23 bins. $50,000. Horner & Wyatt, 468 Bd. Trade Bldg., Kansas City, Mo., engrs.

Kan., Wellington — GRAIN ELEVATOR — Wolcott & Lincoln, Inc., 1st and Grove Sts., Kansas City, Mo., preliminary plans 40 x 226 ft. grain elevator, 183 ft. high, rein.-con., 500,000 bu. capacity, incl. grading, cleaning and conditioning equipment, terminal equipment, hopper scales, electric power. Horner & Wyatt, 468 Bd. Trade Bldg., Kansas City Mo., engrs.

Thousands of projects a year worth billions of dollars to build and equip—CONSTRUCTION DAILY, 10th Ave. at 36th St., New York.

POWER AND LIGHTING

PROPOSED WORK

Calif., Newport Beach—City Council ornamental lighting system, incl. 180 Marbelite standards with underground system in Balboa St., et. al. To exceed $25,000. R. L. Patterson, city engr.

N. J., Westwood—Bd. Boro Council, Boro Hall, ornamental lighting system, widening on Westwood Ave. $67,000. **Maturity probably soon.** Hering & Westphal, 261 Bway., boro engrs.

Okla., Boynton — City Council preliminary plans municipal gas distribution system. $30,000. Private plans.

Tex., Belton—City lighting system on main street.

BIDS ASKED

New York—Apr. 21, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing installing power equipment for portions Lines A and B, Routes 101 and 109, Independent System of City-owned Rapid Transit Railroads, Manhattan and Brooklyn Boros.

Okla., Garber—Apr. 8, by C. N. Birdsall, city clk., municipal gas distribution system. $27,000. Former bids rejected. Long & Co., 1300 Colcord Bldg., Oklahoma City, engrs. Noted Mar. 12.

PARKS AND SPORTS

PROPOSED WORK

Ind., New Albany—Graceland Memorial Park corp., E. W. Hardin, vice pres., playground, incl. 50 x 150 ft. concrete swimming pool. $30,000.

Mass., Boston—City, Park Dpt., 33 Beacon St., playground and field house, Gallivan's Grove, West Roxbury. $100,000. Engineer not selected.

Mass., Wellesley—Town, W. H. Bingham, on committee, playground, incl. baseball and football fields, tennis courts. Hunewell Grounds. $25,000.

Mass., Whitman—Town, Bd. Selectmen, improving Whitman Park and grading, improving high school grounds. $25,000 or more.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, athletic field for Manual Training High School, Red Hook. To exceed $40,000.

O., Cleveland—A. Brown & Associates, East 42nd and Harvard Ave., sports arena, 2,500 seating capacity. $75,000.

BIDS ASKED

Ia., New Hampton—Apr. 6, by F. B. Strike, city clk., 120 x 140 ft. concrete swimming pool, incl. 400 ft. low wall and scum gutter 12,000 sq.ft. 6 in. concrete floor, 6,000 sq.ft. 4 in. concrete beach, 575 ft. 7 ft. fence, bath house, filter house, accessories, $17,500 of which $2,150 covers equipment to be furnished by City. Howard R. Green Co., 208-10 Bever Bldg., Cedar Rapids, engrs.

Mass., Barnstable—See "Contracts Awarded."

Mass., Boston—Apr. 9, by Park Dpt., 33 Beacon St., new municipal golf course Hyde Park-West Roxbury.

Mass., Leominster — Doyle Athletic Field Comn., c/o M. A. Dyer Co., archts., 1 Beacon St., Boston, taking bids 1 story, brick, concrete field house, Priest St. $25,000-$30,000.

N. J., Trenton—Apr. 7, by State Bd. Educ., State House, athletic field, incl. baseball diamond, running track, tennis courts, at State College for Teachers, on Lawrenceville Rd. $25,000. Div. Architecture & Constr., engrs.

N. Y., Brooklyn—Apr. 7, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, constructing new exit roadway adjacent to Park Circle, at Prospect Park and Ocean Parkway, Prospect Park S.W., repaving walks in Laboratory Gardens, and constructing brass lined compass and meridian and 2 cast stone posts, Brooklyn Botanic Garden; improving Unnamed Playground 3, at 2nd Ave., 11th and 12th Sts.

N. Y., Long Island City—Apr. 7, by Park Bd. W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, reconstructing and constructing addition, administration building, incl. plumbing, heating, Forest Park, Kew Gardens; also excavating, filling, planting trees at Glen-

Parks and Sports (Continued)

dale entrance, and walks around bandstand Forest Park: constructing interior and exterior walks, easterly portion Bowne Park.

CONTRACTS AWARDED

Ark., North Little Rock—Camp Pike Comn., J. R. Fordyce, chn., camp improvements, 1 story, 106 x 145 ft., hollow tile, steel, stucco auditorium to R. T. Higgins, Hot Springs, $39,725; rein.-con. swimming pool, to J. H. Reddick, Ft. Smith, $20,250; plumbing and filter, for swimming pool, to Schrader Plumbing & Heating Co., Little Rock, $13,773; wiring, to Arkansas Electric Co., 316 Louisiana St., Little Rock, $1,865. Grand total $75,613.

Mass., Barnstable—Town Bd. Selectmen, athletic field, Hyannis Sect., day labor, $25,000.

HEATING AND VENTILATING

BIDS ASKED

Ind., Columbia City—Apr. 6, by Bd. P. Wks., City Hall, municipal heating equipment, incl. furnishing, erecting water tube boiler, 150 to 175 lb. pressure, soot blower, other accessories, $500,000. E. E. Erdman, city clk.

CONTRACTS AWARDED

N. Y., Attica—Dpt. Correction, State Office Bldg., Albany, heating and sanitary work for Dining-Kitchen and Bakery Building, to Barr & Creelman, 74 Exchange St., Rochester, $1,048 and $1,455 respectively; baking equipment, to A. S. Ruslander, 216 Terrace St., Buffalo, $32,-418; baking ovens, machinery, to J. White, 494 Broome St., New York, $15,700; refrigeration, to Mollenberg Betz Machine Co., 20-26 Henry St., Buffalo, $18,367. Grand total $68,988. Noted Jan. 22.

N. Y., Hollis—Bd. Educ., 500 Park Ave., New York, heating P.S. 35, to D. J. Rice, 41-50 38th St., Long Island City, $55,270; plumbing, to G. D. Casper, 204 Jackson St., Long Island City, $20,500; electrical work, to Yarmark Electrical Co., 305 Bway., New York, $13,600. Grand total $89,370. Noted Mar. 5.

R. I., Middletown—St. George's School, c/o Howe & Church, archts., Turks Head Bldg., Providence, heating in infirmary building, to Taylor Heating Co., 714 Broad St., Providence; plumbing, to A. H. Tilley, 152 Spring St., Newport; electrical work, to Scannevin & Potter, 250 Thames St., Newport. Total est. $25,000. Noted Mar. 26, under "Schools, Contracts Awarded."

UNCLASSIFIED

PROPOSED WORK

Colo., Pueblo—HEALTH RESORT—See "Hospitals."

Mass., Milford—COMFORT STATION—Town, D. J. Sullivan, town clk., 1 story, 25 x 25 ft., brick, concrete comfort station. R. A. Cook, 57 Prospect St., engr.

Mass., Worcester—TANKS—Donohue Coal Co., 11 Canterbury St., furnishing, installing 6 underground tanks, 125,000 gal. capacity. Private plans.

N. J., Linden—DOCK—Bd. City Council, City Hall, timber, concrete municipal dock, Rahway River, $25,000 or more. Project in abeyance. Noted Mar. 19.

N. Y., Brooklyn—CONCRETE TANK ENCLOSURE—Standard Oil Co. of New York, 26 Bway., New York, plans by D. Wortman, 116 Lexington Ave., New York, concrete tank enclosure, Norman and Kingsland Aves. $40,000.

N. Y., Elmira—BULK OIL STATION—Sun Oil Co., 1608 Walnut St., Phila., Pa., and 420 Lexington Ave., New York, bulk oil distribution plant and tank farm. To exceed $75,000.

N. Y., New York—CONCRETE PLATFORM, etc.—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., concrete platform, new plumbing, steel, glass and wire partitions for storehouse, 175 West 228th St. To exceed $40,000. C. J. Klueh, c/o owner, archt.

N. Y., St. George—COMFORT STATION—J. A. Lynch, pres. Richmond Boro. Boro Hall, 4 comfort stations. To exceed $100,000.

Texas—OIL PIPE LINE—Texas Co., West Travis St., San Antonio, and 720 San Jacinto St., Houston, preliminary plans 12 in. c.i. bell joint oil pipe line extending from point north Longview to Nacogdoches, to connect with company's line to Pt. Neches and Port Arthur refineries. $1,000,000. Private plans.

Texas—OIL PIPE LINE—Yount-Lee Oil Co., San Jacinto Life Bldg., Beaumont, surveys 200 mi. 10 in. oil pipe line from Gregg Co. to Coast. $500,000. Private plans.

Texas—REFINERY PLANTS—Amarillo Producers and Refiners Assn., c/o J. D. and J. Wrather, Amarillo, preliminary plans refinery plants, one at Overton $100,000, other at Longview $150,000. Private plans.

Utah, Salt Lake City—CINDER PITS—Union Pacific R.R. Co., R. C. Mann, ch. engr., 1416 Dodge St., Omaha, Neb., 4 x 6 x 150 ft. cinder pits, concrete. $38,000.

N. B., St. John — TANK — McColl-Frontenac Ltd., Notre Dame E., Montreal, Que., 2 m.g. tank. $100,000.

BIDS ASKED

Kentucky—OIL PIPE LINE—See "Contracts Awarded."

Mass., Malden (br. Boston)—COMFORT STATION—Apr. 6, by Park Comrs., 1 story, brick, concrete, Huntings Field, Salem St. $25,000. C. W. Springall, 50 Park St., archt. Noted Jan. 1.

Mass., Rockport—WALL—See "Streets and Roads."

CONTRACTS AWARDED

California—GAS PIPE LINE—Southern Fuel Co., Los Angeles, 136 mi. 26 in. gas pipe line from Kettleman Hills to Los Angeles, to A. O. Smith, 27th and Keefe Sts., Milwaukee, Wis., 25,000 tons additional pipe was awarded to undisclosed contractor.

Kentucky—OIL PIPE LINE—Stoll Oil Co., 227 West Main St., Louisville, 70 mi. oil pipe line from Louisville to Hodgenville, also additional equipment in refinery at Louisville, own forces. Est. $200,000.

Kentucky and Maryland—GAS PIPE LINE—Columbia Gas & Electric Co., 61 Bway., New York, gas pipe line from Kentucky to Baltimore, Md., construction by Columbia Constr. Co., subsidiary of owner; 50 mi. pipe, to National Tube Co., 71 Bway., New York; 50 mi. pipe, to A. O. Smith Corp., 27th and Keefe Sts., Milwaukee, Wis.; 200 mi. pipe, to Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown, O.; 150 mi. pipe, awarded to undisclosed company.

Mo., St. Louis—STONE RAILINGS—Bd. P. Serv., stone railings on Grand Dr. Bridge and bridge on Lindell and Union Blvds., to Wabash Stone Co., 5100 Wise Ave., $21,537. Est. $25,000. Noted Feb. 19.

N. Y., New York—PUMPING EQUIPMENT—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing, installing pumping equipment on Routes 106 and 108, Agreement "KG," to Welsh Bros. Contg. Co., 35 Purvis St., Long Island City, $19,900. Noted Feb. 19.

O., Cleveland—ELECTRICAL WORK—Bd. Educ., F. G. Hogen, dir., electrical work for new South High School (now under construction), to Herman-Mintz Electric Co., 8819 Esterbrook Ave., $65,000. Noted Feb. 19.

Pa., Monessen—LOADING DOCK—Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, rail river loading dock, incl. main dock, 101 ft. long, full revolving all steel electrical traveling crane for interchange of rail and river shipments, also 9 chester wood pile docks, to Dravo Contg. Co., Neville Island.

Tenn., Nashville — GAS STORAGE TANK — Nashville Gas & Heating Co., 226 6th Ave. N., 2,000,000 cu.ft. gas storage tank, 30 ft. high, 148 ft. diam., Whiteside St. and 3rd Ave. N., to United Engineers & Constructors, Inc., 112 North Broad St., Phila., Pa., $200,000.

Texas—OIL PIPE LINE—Magnolia Petroleum Co., Magnolia Bldg., Dallas, and 227 Broadway, San Antonio, laying pipe for pipe line from Center to Kilgore, to Magnolia Pipe Line Co., Center; digging ditches, to McPherson Constr. Co., Center. Noted Mar. 19.

Tex., Altman — GASOLINE REFINERY — Apache Refining Co., c/o R. S. McFarland, Sunray Oil Co., Exch. Natl. Bank Bldg., Tulsa, Okla. or Apache Refining Co., Sunray, Tex., near Altman, 5,000 bbl. gasoline refinery, 3 mi. from here. $200,000. Owner builds. Private plans.

MATERIALS

PROPOSED WORK

RIPRAP—**Los Angeles, Calif.**—Bd. Comrs. Los Angeles Co. received no bids 10,000 tons rock riprap for flood control department levees. E. C. Eaton, ch. engr. Flood Control Dpt. Noted Mar. 12.

BIDS ASKED

WATER PIPE—**Chicago, Ill.**—Apr. 6, by City, City Hall, furnishing, delivering, distributing 535 tons 20 in. c.i. water pipe on various streets. R. W. Wolfe, comr. Dpt. P. Wks.

CULVERT PIPE—**Boone, Ia.**—Apr. 6, at office Auditor Boone Co., 3 carloads 12 and 15 in. corrugated culvert pipe in 22 and 26 ft. lengths pipe to be furnished in ½ lengths with clamps in center.

CULVERT PIPE—**Maquoketa, Ia.**—Apr. 7, at office Auditor Jackson Co., 1,567 lin.ft. 15- to 42-in. culvert pipe. T. E. Riley, Maquoketa, co. engr.

CULVERT PIPE, etc.—**Toledo, Ia.**—See "Streets and Roads."

COPPER PIPE—**Baltimore, Md.**—Apr. 8, by Bd. Awards, furnishing copper pipe to Bureau Water Supply. M. J. Ruark, sewerage engr., and E. G. Rost, water engr., both Municipal Bldg.

SAND, etc.—**Minneapolis, Minn.**—Apr. 10, by P. S. Gram, city purch. agt., 30,000 cu.yd. sand, 40,000 cu.yd. gravel for City Eng. Dpt.

CHLORIDE—**St. Paul, Minn.**—Apr. 8, by State Hy. Dpt., 1246 University Ave., 1,800 tons calcium chloride for season's use.

ROAD OIL, etc.—**East Paterson, N. J.**—Apr. 10, by Bd. Boro Council, Boro Hall, road oil, crushed stone for boro roads. $5,000. A. Noack, 51 Court St., Hackensack, boro engr.

BITUMINOUS ASPHALT EMLUSION, etc.—**Englewood and Alpine, N. J.**—Apr. 13, by Palisade Interstate Park Comn., L. Devo, purch. agt., 141 Worth St., New York, 187,500 gal. bituminous asphalt emulsion on Sect. 1 Hendrick Hudson Dr.; and 300 cu.yd. 1½ in. crushed stone, 4,700 cu.yd. 1½ in. to ¾ in. and 2,200 cu.yd. 1½ to ¾ in. crushed stone, graded, 550 cu.yd. ¾ in. crushed stone, 1,000 cu.yd. 3 in. stone chips, 700 cu.yd. stone dust, $5,000 or more. Private plans.

CEMENT—**Goshen, N. J.**—Apr. 6, by Dpt. Institutions & Agencies, State Office Bldg., Trenton, 10,500 bbl. cement, delivered here.

STRUCTURAL STEEL—**Phila., Pa.**—Apr. 3, by C. E. Welsh, purch. agt., Pennsylvania R.R. Co., 15 North 32nd St., structural steel. Contr. 12, 1931.

CABLE—**Milwaukee, Wis.**—Apr. 8, by Central Bd. Purchases, 284,000 ft. lead covered and steel-taped cable, 4 unit ventilators, 1 power flusher. J. W. Nicholson, purch. agt.

CONTRACTS AWARDED

STEEL PIPE—**Oakland, Calif.**—J. H. Kimball, secy., East Bay Municipal Utility Dist., 6,000 ft. electric welded sheet steel pipe, to Steel Tank & Pipe Co., 1100 4th St., Berkeley, $16,800.

ROAD SURFACING TAR—**Hartford, Conn.**—Bd. Contr. & Supply, 90,000 gal. road tar for treating macadamized streets, to Amer. Tar Products Co., 1109 Industrial Trust Bldg., Providence, R. I., $11,040. Noted Mar. 12.

CINDERS, etc.—**Baltimore, Md.**—Bd. Awards, furnishing cinders to Hys. Dpt., to E. T. Foreman, 125 North High St., $22,000; crushed stone to City, to Harry T. Campbell & Sons Co., Towson, $46,545—furnishing, delivering sand and gravel to Arundel Corp., Pier 2, Pratt St., $74,000. Grand total $142,545. Noted Mar. 12.

ROAD OIL—**Clayton, Mo.**—St. Louis Co., Court House, 380,000 gal. more or less road oil (to be ordered as needed during 1931), to St. Louis Asphalt Co., 2626 Chouteau Ave., St. Louis, at $0.0245 per gal.; 250,000 gal. more or less bitumen (asphalt), to Rock Hill Asphalt Co., 1210 North Rock Hill Rd., Webster Groves, at $0.0919 per gal.

CONCRETE, SAND, etc.—**Phila., Pa.**—See "Streets and Roads."

CEMENT—**Providence, R. I.**—Bd. Contr. & Supply, furnishing cement as specified, for P. Wks. Dpt., to Wallace & Tucker Lumber Co., 434 Allens Ave., $31,650.

ASPHALTIC ROAD OIL—**Wisconsin**—State Hy. Comn., and Hy. Comrs., Ashland, Baron, Bayfield, Burnett, Douglas, Polk, Rusk, Sawyer and Washburn Counties, Type CC road oil, to Shell Petroleum Corp., Shell Bldg., St. Louis, Mo., $80,023. Noted Mar. 12.

ROAD OIL—**Superior, Wis.**—State Hy. Comm., 1,827,000 gal. road oil, to Ashland, Barron, Bayfield, Burnett, Douglas, Polk, Sawyer, Rusk and Washburn Counties, to Shell Petroleum Corp., Shell Bldg., St. Louis, Mo., at $0.438 per gal., total $80,023.

ROAD OIL, etc.—**London, Ont.**—A. Near, city engr., road oil and refined asphalt, to Mexican Petroleum Co., 122 East 42nd St., New York; iron castings, to E. Leonard & Sons, London; broken stone, to Consolidated Sand & Gravel Co., Radford Bldg., Toronto; concrete sewer pipe, to Independent Concrete Pipe Co., Woodstock. Est. $200,000.

Build your own living mailing lists and add names to them every day. In this way alone, you will be adding hundreds of dollars a year in equipment value—CONSTRUCTION DAILY, 10th Ave. at 36th St., New York.

EQUIPMENT

PROPOSED WORK

ROAD GRADER—**Riverbank, Calif.**—City Council purchasing road grader.

BIDS ASKED

TRACTOR — **Amesbury, Mass.** — James E. Watkins Co., Amesbury, in market 30 hp. tractor, crusher-elevator, steel tanks, watering carts and 20 ton truck scale.

CRAWLER TYPE TRACTOR—**Hibbing, Minn.**—May 24, by H. F. Dear, village recdr., one 5 ton crawler type tractor.

TRUCK—**Jackson, Minn.**—Apr. 7, by V. J. Buckeye, aud. Jackson Co., one 1½ ton truck.

GRADER—**Long Prairie, Minn.**—Apr. 8, by L. J. Bolstrad, aud. Todd Co., elevating grader.

PATROL GRADER—**Mankato, Minn.**—Apr. 9, by B. E. Lee, aud., Blue Earth Co., 1 motor patrol grader.

TRUCK—**Minneapolis, Minn.**—Apr. 8, by F. S. Gram, purch. agt., one 3½ ton truck for city workhouse; 1 power operated road marking machine. N. W. Elsberg, city engr.

TRACTOR—**St. Cloud, Minn.**—Apr. 8, by N. Thomey, aud. Stearns Co., 1 tractor.

PLAYGROUND EQUIPMENT — **New York, N. Y.**—Apr. 6, by P. J. Dooling, comr. Purchase, Municipal Bldg., playground equipment for Parks—Bronx and Parks—Queens; swing crane on tractor to Dpt. Water Supply, Gas & Electricity.

GRADERS—**Bismarck, N. D.**—Apr. 8, by A. C. Isaminger, aud. Burleigh Co., 1 elevating grader, one 12 ft. blade grader.

Constr. News page 143

Equipment (Continued)

GRADER, MOTOR PATROLS—**Devils Lake, N. D.**—Apr. 7, by J. A. Kramer, aud. Ramsey Co., 1 elevating grader and 1 or more motor patrols.

TRACTORS, etc.—**Valley City, N. D.**—Apr. 10, by J. M. Baillie, aud. Barnes Co. crawler type tractors and motor patrols for 1931 season.

ROAD MAINTAINER—**Wichita Falls, Tex.**—Apr. 6, by Wichita Co., c/o P. Barnett, aud., 1 road maintainer for Precinct 4.

QUARRYING EQUIPMENT—**Peninsula, Ont.**—Cold Spring Granite Co. Ltd., W. G. Langworthy, mgr., in market quarrying and other equipment.

PLANT EQUIPMENT—**Weston, Ont.**—Dundas Concrete Block Co. Ltd., A. Hendricks, mgr., in market general equipment for small plant.

CONTRACTS AWARDED

STEEL TANK—**Phila., Pa.**—See "Streets and Roads."

FOREIGN

Egypt, Cairo—June 6, by Dpt. Finance, 5,500 tons new or second hand light and heavy steel rails.

New Zealand, Wellington—May 19, by Secretary P. Wks., Supplies & Tenders, 2250 suspension insulators strings complete with fittings.

New Zealand, Wellington—June 2, by Secretary P. Wks., Supplies & Tenders, Com., induction voltage regulators.

New Zealand, Wellington—June 19, by New Zealand Government Railroads, one 10 ton traveling crane.

New Zealand, Wellington—June 30, by Secretary, P. Wks., Supplies & Tenders ,2 permanent sluice gates and 2 stop gates.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

N. J., Asbury Park—See "Contracts Awarded."

N. J., Jersey City—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Laurelton—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., Rego Park—See "Contracts Awarded."

Wis., Milwaukee — Van Alyea & Spintii, archts., 408 Albion St., taking bids 15 story, 60x69 ft., brick, steel, rein.-con., East Wells St., for H. E. Thwaits, c/o architects.

Wis., Shorewood—R. E. Stoelting, 1799 Teutonia St., taking bids 8 story, 94x108 ft., brick, steel, East Capitol St. W. E. Stuckert, 377 Prospect St., archt.

CONTRACTS AWARDED

Calif., Los Angeles—Owner, two 4 story, basement, 50 x 150 ft. brick apartments, Hayward Ave., and one 7 story, basement, rein.-con. apartment, Detroit St., to E. S. Marsh, Delta Bldg., $225,000 and $160,000 respectively.

Mass., Malden (br. Boston) — Owner c/o Eisenberg & Feer, 11 Beacon St., Boston, archt., 4 story, basement, brick, stone, steel, plain found., to L. B. Cadario & Sons, 260 Tremont St., Boston. Est. exceeds $150,000. Noted Mar. 5.

N. J., Asbury Park—A. Marshall, Electric Bldg., 5 story, basement, brick, steel, 5th Ave., separate contracts. $200,000. P. Freshman, 50 Court St., Brooklyn, N. Y., archt.

N. J., Jersey City—Meltzer Bros., 1022 Hudson Blvd., Bayonne, 5 story, basement, brick, steel, Fairmount Ave., separate contracts, $300,000. C. I. Goldberg, 921 Bergen Ave., archt.

N. Y., Brooklyn—Cameo Constr. Corp., 1468 East 45th St., 2 story, Avenue K and East 41st St., day labor and separate contracts. $150,000. I. Kallich, 26 Court St., archt.

N. Y., Brooklyn—Corporation, c/o D. Match, 2622 Avenue U, apartment, East 35th St. and Avenue T, separate contracts. $150,000. I. Kallich, 26 Court St., archt.

N. Y., Brooklyn—H. B. Constr. Co., c/o M. A. Cantor, archt., 186 Joralemon St., 6 story, basement, 126x140 ft., Ocean Ave. and Avenue R, separate contracts, $250,000.

N. Y., Brooklyn—K. R. Building Corp., L. Koppler, pres., 530 West 113th St., 6 story, 90x90 ft., Newkirk Ave. and East 26th St., separate contracts, $150,000. Scelig & Finkelstein, 153 Pierrepont St., archts.

N. Y., Brooklyn—Ludor Constr. Co., A. Kaskel, pres., 4753 13th Ave., 6 story, 50x105 ft., Parkside Ave., east of Bedford Ave., separate contracts and day labor. $150,000. J. Tabatchnik, 32 Court St., archt.

N. Y., Brooklyn—Singein Building Corp., 160 East 53rd St., 6 story, 100x100 ft., Avenue P and West 3rd St., separate contracts. $180,000. M. Hirsch, 350 Stone Ave., archt.

N. Y., Brooklyn—Tiffany Homes, Inc., H. Rissier, pres., 3613 Avenue M, 2 story, 48th St. and Avenue J, separate contracts, $150,000. J. M. Ricca, 375 Fulton St., archt.

N. Y., Laurelton—Laurelton Homes, Inc., 160-16 Jamaica Ave., apartment, 227th St. and 130th Ave., separate contracts. $150,000. A. Allen, 163-18 Jamaica Ave., archt.

Constr. News page 141

N. Y., New York—Midoro Operating Co., 2701 Kingsbridge Rd., 6 story, 225th St. and Marble Hill Ave., separate contracts. $150,000. N. Rotholz, 155 East 42nd St., archt.

N. Y., New York—Wichover Corp., lessee, T. W. White, pres., 160 Bway., c/o Fidelity & Deposit Co. of Maryland, 15 story, 96x113 ft., Greenwich Ave. and Christopher St., separate contracts. $850,000. Van Wart & Wein, 347 Madison Ave., archts.

N. Y., Rego Park (Jamaica P. O.)—Rego Park Constr. Co., Rego Park, apartments, East 63rd Ave. and Haring Pl., separate contracts. $150,000. B. Braunstein, 163 Jamaica Ave., Jamaica, archt.

CLUBS

PROPOSED WORK

Mass., Quincy—Y. M. C. A., F. Folmsbee, Y. M. C. A. Bldg., plans by Architectural Bureau Y. M. C. A., 347 Madison Ave., New York, new Y. M. C. A. Building, Upland Rd. $500,000-$700,000. **Maturity about June.**

N. J., Long Branch—Young Men's Progressive Assn., c/o Commercial Hotel, 149 Bway., two 2 story, basement, brick, steel solariums, Ocean front and Bath Ave. $200,000. **Maturity about June.** Noted Mar. 19.

N. J., Jersey City—J. F. Jackson, archt., 137 East 45th St., New York, soon lets general contract 7 story, basement, 100 x 100 ft., brick, steel addition, Fairview Ave., for Y.M.C.A., H. Lipscomb, genl. secy., 654 Bergen Ave. $300,000. Noted Feb. 26.

BIDS ASKED

N. J., Newark—Italian Catholic Club, c/o J. Centanni, archt., 142 Market St., Newark, bids about May 15, general contract 3 story, basement, brick, steel, Summer Ave. $150,000. Noted Mar. 19.

O., Toledo—Apr. 24, by Mills, Rhines, Bellman & Nordhoff, archts., Ohio Bldg., 8 story, basement, rein.-con., building, for Y.M.C.A., H. Anderson, pres. $1,000,000. Noted Dec. 4.

CONTRACTS AWARDED

Pa., Bradford—T. K. Hendryx, archt., 301 Terminal Bldg., 5 story, basement, 82 x 96 ft., brick, steel, stone lodge, to Tuna Mfg. Co., 70 Mechanic St., for Tuna Lodge 411 I.O.O.F., J. Polley, in charge building comm., 111 High St. Est. $175,000. Architect soon lets mechanical contracts. Noted Feb. 26, under "Contracts Awarded."

HOSPITALS

PROPOSED WORK

Conn., Norwich — State, Norwich State Hospital, plans by Cudworth & Thompson, Disco Bldg., dining hall addition, $60,000; male employees home, $100,000.

Conn., Norwich — State, Uncas-On-Thames Sanatorium, plans by W. A. Kinne, 256 Main St., Derby, nurses home, infirmaries, cottages, etc., all brick and steel, at Sanatorium, Uncas-On-Thames. $485,000 appropriated. Noted Mar. 5.

Conn., Shelton—State, Laurel Heights Sanatorium, Tuberculosis Comn., Hartford, infirmary, $350,000 appropriated. Architect not selected.

Colo., Pueblo—J. W. and A. D. Field, 36 West 59th St., Kansas City, Mo., c/o J. F. Codding, Rye, sketches sanitarium, health resort, incl. hydro-electric plant, dam, lake, sawmill, cabins.

Me., Portland—Maine Eye & Ear Infirmary Corp., E. E. Holt, supt., plans by J. C. and J. H. Stevens, 477 Congress St., 5 story, basement, brick, stone, concrete hospital addition, plain found., Bramhall and Congress St. $500,000. Noted Oct 2.

Mass., Boston—City, Hospital Dpt., 818 Harrison Ave., relief station—Forest Hills Station. Architect not selected. To exceed $150,000.

Mass., Holyoke—House of Providence Hospital, 679 Dwight St., plans by J. W. Donahue, 1200 Main St., Springfield, brick, steel maternity unit at hospital, Dwight St. $150,000.

Mass., New Bedford—St. Luke's Hospital, S. Whitcher, supt., Allen St., hospital addition, Allen St. and Taber St. $150,000. Architect not selected.

Mass., Waltham — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, sketches by G. Robb, 87 Beacon St., Boston, brick, rein.-con., steel hospital unit, $150,000 or more.

Mass., Worcester — City, P. Building Dpt., brick, steel addition to City Hospital, Queen and Chandler Sts. $150,000 or more. Architect not selected.

N. J., New Brunswick—Maginnis & Walsh, archts., 100 Boylston St., Boston, Mass., soon lets general contract completing main building and constructing two 5 story, basement, 45x110 ft., brick, steel, rein.-con. wings, Easton Ave., for St. Peters General Hospital, Easton Ave. $200,000. Noted Mar. 20 Daily.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, bids after June 1, general contract hospital extension, Coney Island Hospital, Ocean Parkway. $150,000. Dodge & Morrison, 160 Pearl St., New York, archts. Noted Jan. 8.

N. Y., Elmhurst—Dpt. Hospitals, Municipal Bldg., New York, sketches by S. W. Jones, 25 West 45th St., New York, hospital, Queens Blvd. and Grand Ave. $2,500,000. Noted Mar. 26.

N. Y., Neponsit Beach (mail Far Rockaway) —Dpt. Hospitals, Municipal Bldg., New York, bids after June 1, nurses' home, dormitory at Neponsit Hospital. $300,000. Dodge & Morrison, 160 Pearl St., New York, archts. Noted Jan. 1.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., children's tuberculosis camp, Believue Hospital, foot 26th St. $350,000. **Maturity** July. M. Bernstein, 2 Columbus Circle, archt. Noted Jan. 1.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids late in May, general contract 4 story 95x139 ft. male dormitory at Metropolitan Hospital, Welfare Island, opposite 83rd St. $325,000. M. Bernstein, 2 Columbus Circle, archt.

Pa., Phila.—Wills Hospital, 1810 Race St., plans by J. T. Windrim, Commonwealth Bldg., 8 story, basement, on 146 x 197 ft. site, 16th and Spring Garden Sts. $800,000.

Pa., Pittsburgh—Pittsburgh Eye & Ear Hospital, 1945 5th Ave., bids about August, general contract hospital. E. P. Mellon, 350 Madison Ave., New York, archt. Noted Nov. 20.

Pa., Pittsburgh—South Side Hospital, J. E. Roth, pres., 1800 Carson St., plans by P. C. Dowler, Century Bldg., and S. S. Goldwater, consult. archt., 1212 5th Ave., New York, 120 x 180 ft. addition, incl. nurses building, additions to power house, South 20th and Jane Sts. $1,500,000.

Wis., Wauwatosa — Salvation Army, B. C. Rodda, 217 4th St. Milwaukee, soon lets contract 3 story, basement, 50 x 150 ft., brick steel addition, 63rd St. A. C. Fehlow, 649 Caldwell Ave., Chicago, Ill., archt.

BIDS ASKED

Mass., Pittsfield—House of Mercy Hospital, 741 North St., taking bids selected list contractors, 3 story, basement, 45 x 155 ft., brick, steel, stone hospital addition, plain found., North St. $150,000. Harding & Seaver, 7 North St., archts. Noted Nov. 13.

N. J., Verona—Apr. 15, by Bd. Freeholders Essex Co., Hall of Records, Newark, general contract 2 story, basement, brick, steel staff house at Essex Mountain Sanitarium grounds. $150,000. Sutton & Sutton, 402 Broad St., Newark, archts.

N. Y., New York—Beth Israel Hospital, 60 Jefferson St., taking bids altering and constructing hospital addition, 60 Jefferson St. $150,000. H. Hurwit, 41 West 33rd St., archt. Noted Jan. 15.

Pa., Pittsburgh—Stone & Webster, superv. engrs., Union Trust Bldg., taking bids found. and structural steel for 12 story, basement, 52 x 165 ft. brick, steel hospital, Darragh St., for Presbyterian Hospital, J. McA. Duncan, in charge building comr., 340 Highland Ave. $2,000,000. E. F. Blakeslee, in charge of office. A. Lyness, in charge at site. E. P. Mellon & W. L. Smith, Koppers Bldg., Pittsburgh, and 350 Madison Ave., New York, archts.

Pa., Pittsburgh—Stone & Webster, superv. engrs., Union Trust Bldg., taking bids founds. and structural steel for 11 story, basement, 42 x 130 ft., brick, steel Darragh St., for Pittsburgh Eye & Ear Hospital, J. E. Crawford in charge Building Com., Berger Bldg. Total $1,000,000. E. P. Mellon & W. L. Smith, Koppers Bldg., Pittsburgh, and 350 Madison Ave., New York, archts. E. F. Blakeslee, in charge office and A. Lyness, in charge at site.

CONTRACTS AWARDED

La., New Orleans—M. H. Goldstein, archt., Amer. Bank Bldg., 4 story, basement, 51 x 136 ft. rein.-con., brick veneer, cast stone, terra cotta main building, concrete pile found., also 2 story, 30 x 140 ft. frame, stucco nurses home, 1 story, 22 x 53 ft. laundry building, to G. J. Glover Co., Whitney Bldg., for Flint-Goodrich Hospital, 1566 Canal St., $240,646. Noted Mar. 12.

Mich., Detroit—St. Joseph's Mercy Hospital, East Grand Blvd., 7 story, basement, 60 x 124 ft., brick, steel, rein.-con., stone nurses' home, plain found., to H. G. Christman-Burke Co., Fisher Bldg. Est. $240,000.

N. Y., Central Islip—Dpt. Mental Hygiene, State Office Bldg., altering dining room and kitchen building, tunnel at Central Islip State Hospital, to Brady Concrete Corp., 25 West 45th St., New York, $346,400; heating, to Heat Control Serv. Co., 3102 Clarendon Rd., $447,500; sanitation, to T. J. Byrne, 355 West 26th St., New York, $3,600; electrical work, to Hoffman & Elias, 254 West 31st St., New York, $172,470. Grand total $969,970. Noted Jan. 22.

Tenn., Nashville—Asmus & Clark, archts., 1415-18 Nashville Trust Bldg., general contract additions and remodeling hospital and nurses' home, to Foster & Creighton, 4th and 1st Natl. Bank Bldg. for State Hospital. Est. $500,000. Noted Feb. 5.

Ont., London—John M. Moore & Co., archts., 489 Richmond St., 3 story, 50x200 ft., brick addition, to R. G. Wilson & Son, 193 College Ave., for Parkwood Hospital Trustees, A. Ureu, supt.; steam heating from present central heating plant, to Bennett & Wright, 286 King St. Est. $150,000. Noted Mar. 19.

CHURCHES

PROPOSED WORK

Conn., West Hartford (br. Hartford)—Asylum Avenue Baptist Church, F. B. Haggard, pastor, G. Chandler, chn. new com., plans by Ebbets & Frid, 15 Lewis St., Hartford, church, Asylum Ave. and Sigourney St. $150,000. Noted Feb. 19.

Ind., Gary—Holy Angels Parish, T. Jansen, pastor, 640 Tyler Ave., plans by Vincent & Fagan, Poledor Bldg., South Bend, rein.-con., brick church. $400,000.

Mass., Dorchester (sta. Boston)—St. Brenan's Roman Catholic Church, W. T. Twohig,

Churches (Continued)

pastor, soon takes bids 1 story, basement, irregular sized granite church, plain found., Southern Artery, $150,000. E. T. Graham, 171 Newbury St., Boston, archt.

BIDS ASKED

Ill., Chicago—Catholic Bishop of Chicago, 719 Rush St., bids about Apr. 10, basement for 1 story, 111 x 208 ft. church, 70th and Wood Sts. Complete building $350,000. Meyer & Cook, 820 North Michigan Ave., archts.

Mass., Springfield — Union Congregational Church, J. B. Lewis, pastor, 42 Parkwood St., taking new bids, 1 story, basement, 50 x 100 ft., brick, stone, Pine Point St., $150,000. R. B. Warner, 129 Ingersoll Dr., archt. Noted Mar. 26.

N. J., Westfield—A. R. Hennell, archt., 636 Prospect St., taking bids 3 story, basement, brick, steel, parish house addition, St. Paul Ave., for St. Pauls Episcopal Church. $150,000. Noted Mar. 12.

O., Cleveland—Apr. 5, by St. Joseph's Greek Church, S. E. Mokriss, chn. building com., 3719 East 110th St., 2 story, basement, 48 x 125 ft., brick, steel, concrete, Orleans Ave. $150,000. H. Hradilek, Ulmer Bldg., archt. Noted May 29.

Ont., Ottawa—Apr. 7, by J. J. O'Gorman, pastor, 193 4th Ave., brick, rein.-con., steel, stone, plain found., for Blessed Sacrament Parish, 4th Ave. $200,000. J. G. Morton, 86 Adelaide St., Toronto, archt. Noted Oct. 23.

CONTRACTS AWARDED

Conn., Bridgeport—Holy Rosary Roman Catholic Parish, A. Daly, pastor, 1 story, basement, 60 x 110 ft., brick, stone, to E. & F. Constr. Co., 94 Wells St. Est. $150,000. Noted Feb. 19.

SCHOOLS

PROPOSED WORK

Ark., Little Rock—University of Arkansas, School of Medicine, c/o Bd. Trustees, sketches brick, concrete, stone medical school. $275,000.

Calif., Berkeley — University of California plans by G. W. Kelham, 315 Montgomery St., San Francisco, gymnasium, on campus. $1,000,000.

Del., Brandywine Hundred—Delaware School Foundation, A. J. Taylor, pres., Du Pont Bldg., Wilmington, plans by Guilbert & Betelle, 20 Branford Pl., Newark, N. J., and may take bids about May 1, general contract Marshallton Consolidated School, 2 story, basement, brick, steel, plain found. $175,000.

Ill., Maywood—Bd. Educ. plans by Van Guten & Van Guten, assoc. archts., 26 East Huron St., Chicago, and N. M. Dunning, 25 East Jackson Blvd., Chicago, Emerson School, 2 story, basement, brick, incl. gymnasium, also remodeling present adjoining building, Washington St. and 3rd Ave. $225,000. Noted Mar. 20.

Ind., Boone Grove—School Comrs. sketches brick, steel school, incl. gymnasium. $150,000. Architect not selected.

Ind., East Chicago—School Comrs. sketches Washington Industrial Grade and High School incl. shops, laboratories, rein.-con., brick. $350,000. Architect not selected.

Ind., Seymour—School Comrs. plans by W. J. Findt, New Albany, 2 brick, steel schools $150,000.

Ind., Rockville—School Comrs. plans by H. L. Fillinger, Dana, 2 story, basement, brick, steel, stone grade school. $150,000.

Md., Annapolis—School Comrs, Anne Arundel Co., G. T. Fox, supt., plans by Buckler & Fenhagen, 325 North Charles St., Baltimore, 2 or 3 story, basement, brick high school. $325,000.

Md., Baltimore—Mayor and City Council, City Hall, plans by W. F. Stone, Jr., 2612 North Charles St., brick, steel, concrete school for handicapped colored children, Franklin and Schroeder Sts. $350,000.

Md., Glenburnie—School Comrs, Anne Arundel Co., G. T. Fox, supt., Annapolis, plans by Buckler & Fenhagen, 325 North Charles St., Baltimore, 2 story, basement, brick high school. $150,000.

Mass., Adams—Town, R. S. Smith, school supt., 2 story, basement, brick addition to Junior High School, Main St. $150,000. Architect not selected.

Mass., Amherst—Massachusetts Agricultural College, State Bd. Educ., State House, Boston, plans by C. P. Hoyt, 8 Beacon St., Boston, brick, stone library addition. $175,000.

Mass., Arlington — Town, Bd. Selectmen, sketches by G. E. Robinson, 80 Federal St., Boston 2 story, basement, brick high school addition, Mass. Ave. $150,000.

Mass., Boston—Northeastern University, F. T. Spear, 316 Huntington Ave., engineering school, 2 or more units, Huntington Ave. $150,000 or more. Architect not selected.

Mass., Groveland—Town, Building Comn., F. R. Hardy, 2 story, basement, brick high school, Gravel Ridge. $150,000. Architect not selected.

Mass., Saugus—Town, H. A. McCullough, chn. building comn., plans by R. T. Jackson, 44 School St., Boston, brick, and steel high school. $400,000-$500,000. Fay, Spofford & Thorndike, 44 School St., Boston, engrs. Noted Mar. 26.

Mass., West Roxbury (sta. Boston)—City of Boston, Dpt. School Bldgs, sketches by H. R. Duffee, 364 Belgrade Ave., Roslindale, 2 story, basement, brick, stone, plain found. Robert Gould Shaw Dist. $200,000.

Mich., Grand Rapids—Bd. Educ., L. A. Butler, supt. plans by H. H. Turner, 923 Michigan Trust Bldg., 2 story basement, 66x160 ft., brick, rein.-con., steel Palmer School site, also brick, steel, rein.-con. addition to Union High School, plain founds. $150,000.

Mich., Redford (sta. Detroit)—Bd. Educ., 1354 Broadway Ave., plans by F. Eurich, Jr., 2539 Woodward Ave., Detroit, 2 and 3 story, basement, brick, steel, rein.-con. high school, plain found., Grand River Ave. $750,000.

Mo., Kansas City—Bd. Educ. soon takes bids 3 story, basement, brick, rein.-con. high school addition, 20th St. and Van Brunt Blvd. $400,000. C. A. Smith, 800 Finance Bldg., archt. Noted Oct. 9.

N. H., Exeter—Phillips Exeter Academy, L. Perry, principal, plans by Cram & Ferguson, 248 Boylston St., Boston, Mass., 3 story, brick, limestone, inn. $150,000. Buerkel & Co., 24 Union Park St., Boston, Mass., engrs.

N. J., Blairstown—Blair Academy, 1 story, basement, 80 x 130 ft., brick, steel, auditorium, $150,000. Project in abeyance, award indefinite. Starrett & Van Vleck, 393 7th Ave., New York, archts. Noted Jan. 22.

N. J., East Orange—Bd. Educ., 19 Winan St., Junior High School, 3 story, basement, brick, steel, North Clinton St. and Renshaw Ave. $150,000 or more. Architect not selected.

N. J., East Orange—Bd. Educ., 19 Winan St., 2 story, basement, brick, steel, Eastern Dist. $150,000. **Maturity probably soon.**

N. J., Irvington (br. Newark)—Bd. Educ., 1253 Clinton Ave., revised plans by Schneider, Kleeman & Werther, 1007 Broad St., Newark, altering and constructing two 2 story, basement, brick, steel, rein.-con. school additions, Grove St. $250,000. Noted Mar. 19.

N. J., Newark—Bd. Educ., City Hall, 3 story, basement, brick, steel additions to Maple Avenue and Peshine Ave., Schools. $150,000 each. Projects in abeyance. Architect not selected. Noted Mar. 5.

N. J., Oakhurst—Bd. Educ. Ocean Twp, sketches by W. Pieper, 95 Summit Ave., Summit, 2 story, basement, brick, steel school addition. $150,000. Noted Mar. 19.

Pa., Irwin—Bd. Educ., C. Drake, pres., J. I. Marsh, secy., plans by Hunter & Caldwell, 600 Central Trust Bldg., Altoona, rebuilding brick, steel, elementary school, incl. gymnasium, recently destroyed by fire, Chestnut St. $200,000. Noted Jan. 22.

Tex., San Antonio—Bd. Educ., Lavaca and Water Sts., plans by H. P. Smith, Natl. Bank Commerce Bldg., and Phelps & DeWees, School Bd. archt., Gunter Bldg., and H. P. Smith, Natl. Bank of Commerce Bldg., and soon takes bids converting 2 buildings into industrial school for men and boys and vocational school for girls and women, erecting 1 industrial building, with shops, Romana and Main Sts. $150,000 or more.

Ont., Toronto—University of Toronto, Queens Park, sketches by A. D. LePan, building supt., University of Toronto, 2 or 3 story, basement, concrete, brick, stone, steel, recreational and gymnasium building, Hoskin Ave. $300,000. Architect not appointed.

BIDS ASKED

Ill., Springfield—J. W. McCarthy & Co., archts., 139 North Clark St., Chicago, bids about Apr. 4, 3 story, brick, stone school, for Catholic Bishop.

Ind., Michigan City — Apr. 30, by School Comrs., Park Elementary School, 2 story, basement, rein.-con., brick, stone. $150,000. S. P. Boonstra, Michigan City, engr. Noted Mar. 12.

Ind., Oldenburg—Franciscan Fathers Catholic Church taking bids 2 story, basement 60 x 135 ft., rein.-con., brick, stone, school incl. gymnasium, auditorium, $150,000. Werking & Son, 2002 East Main St., Richmond, archts. Noted Mar. 5.

Ind., Plainfield — Bd. School Comrs, taking bids 2 story, basement, brick, steel, stone high school, incl. gymnasium, auditorium, $150,000. Parker & Faulstich, 501 Bd. of Trade Bldg., Indianapolis, archt.

Me., Augusta—St. Augustine's Roman Catholic Church, J. A. Casavant, pastor, c/o T. J. O'Connell, archt., 134 Newbury St., Boston, Mass., taking bids altering and constructing 2 story, basement, brick school addition, plain found. $150,000.

Mass., Cambridge—Parish of Our Lady of Pity, A. Millet, pastor, 35 Middlesex St., taking bids 3 story, basement, irregular sized, brick, stone, steel convent, plain found., North Cambridge, $150,000. J. G. Morissette, 575 Essex St., Lawrence, archt. Noted Jan. 29.

Mass., Leominster—City, School Comn., taking bids altering and constructing 2 story, basement, brick, stone, addition, plain found., Lancaster St. $150,000. M. A. Dyer Co., 1 Beacon St., Boston, archts. Noted Mar. 12.

Pa., Erie—Apr. 16, by Bd. Educ., R. S. Scovell, secy., Library Bldg., Technical High School, 1 story, 40x270 ft., brick, steel, incl. wood working, metal working, other technical equipment, 10th and Sassafrass Sts. Meyers & Johnson, 821 Commerce Bldg., archts. Noted Jan. 29.

Pa., Pittsburgh—E. F. Blakeslee, superv. engr. University of Pittsburgh, Aliquippa St., taking bids Fanny Edel Faulk Elementary School, 2 story, basement, 50 x 100 ft., brick, steel, Aliquippa St. $325,000. Janssen & Cocken, Century Bldg., archts. Stone & Webster, Union Trust Bldg., superv. engrs. Noted Mar. 26.

CONTRACTS AWARDED

Conn., New Haven—Sheffield Scientific School, Trustees Yale University, 4 story, tower, cut stone college industrial engineering building, to Dwight Building Co., 67 Church St. Est. $800,000. Noted Apr. 17, 1930.

Fla., Tallahassee—State Bd. Control, 4 story, 45 x 132 ft. wing addition to history building, incl. auditorium, stage and 15 lecture rooms, at State College for Women, to J. M. Raymond Constr. Co., Jacksonville, $93,178. Noted Mar. 28.

Ill., Elsah—Principia College, c/o T. E. Blackwell, Jr., bus. mgr., 5457 Page Blvd., St. Louis, N. Y., several 2 story, basement, English country style houses, main building with library and chapel, to Dickie Constr. Co., 317 North 11th St., St. Louis, Mo., on fee basis. Total est. $3,500,000, incl. heating, lighting, road and drainage facilities, furniture and equipment. Noted Dec. 25.

Mass., South Hadley—Mt. Holyoke College, M. E. Woodley, pres., 3 story, basement 55 x 135 ft., brick, stone, rein.-con., physical laboratory, to E. J. Pigney, Inc., 220 Dwight St., Springfield. Est. $200,000. Noted Feb. 5.

Mich., Ann Arbor—University of Michigan, Ann Arbor, general contract Hutchins Hall, 4 story, basement, brick, rein.-con., steel, incl. class rooms, lecture rooms, court rooms for law school, plain found., State and Monroe Sts., to James Baird Co., 101 Park Ave., New York. Est. $1,500,000.

Mich., Battle Creek—Bd. Educ., general contract 2 story, basement, brick, steel, stone, rein.-con., plain found., to R. G. Phelps, Battle Creek, $167,814; steam heating, to Hunter-Pfeil Co., Battle Creek, $66,215. Noted Mar. 12.

Mo., Jefferson City—St. Peter's Catholic Parish, c/o J. Selinger, pastor, general contract 2 story, basement, 59x116 ft., brick, rein.-con., school, to McCarthy Bros. Constr. Co., 4908 Delmar Blvd., St. Louis.

N. J., Glen Rock—Bd. Educ., Boro Hall, general contract 2 story, basement, brick, steel addition to School 2, to Main Constr. Co., 110 Park Pl., Passaic, est. $60,000; plumbing to J. H. Faber Plumbing Co., 237 Diamond Bridge Ave., Hawthorne; heating, to McGrath Co., 185 Moore St., Hackensack, $14,000. Noted Mar. 12.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, general contract addition to P. S. 101, to Seaman Constr. Co., 145 West 57th St., New York, $189,210. Noted Feb. 5.

N. Y., New York—Bd. Educ., 500 Park Ave., general contract P. S. 76, Bronx Boro, to Arcetini Bros., 205 East 42nd St., $464,800. Noted Nov. 27.

N. Y., White Plains—School Bd., general contract 3 story, 210 x 395 ft., brick, to D. M. W. Contg. Co., 2058 Fulton St., Brooklyn, $727,000; heating, to Hauxwell & Smith, 47 Broad St., Port Chester, plumbing, to G. E. Gibson, 341 Lexington Ave., New York; electrical work, to Lord Electric Co., 105 West 40th St., New York. Noted Mar. 18 Daily.

Pa., Knoxville — Bd. Educ., Administration Bldg., general contract Junior High School, 3 story, basement, 69 x 407 ft., to H. Miller & Sons Co., 2565 5th Ave., Pittsburgh, $302,271; heating and ventilating, to W. N. Sauer Co., 806 Chestnut St., Pittsburgh, $54,341. Noted Mar. 12.

Watch CONSTRUCTION DAILY for the right time to approach owner, architect, or builder.

THEATRES

PROPOSED WORK

Mass., Springfield—Winchester Square Assn., J. S. Silver, 706 State St., plans by L. J. Thompson, 521 Corbin Ave., New Britain, Conn., and soon takes bids 1 story, mezzanine, 80 x 128 ft. brick, steel, cast stone theatre, plain found., State St. $150,000. Noted Apr. 3, 1930.

N. Y., New York—F. H. T. Holding Corp., H. Trub, pres., 309 West 23rd St., sketches by T. W. Lamb, 701 7th Ave., altering 4 story theatre, stores, office, 302 West 24th St. $350,000.

BIDS ASKED

N. Y., New York—Apr. 7, by Loews Theatres, Inc., 1540 Bway., theatre, 72nd St. and 3rd Ave. $750,000. T. W. Lamb, 644 9th Ave., Archt. Weinberger & Weisholf, 247 Park Ave., structural engr. F. J. Bernstein, 40 East 49th St., consult. engr.

Va., Charlotteville—Paramount Publix Theatres, Inc., Paramount Bldg., New York, bids about May 1 or later, theatre, $350,000. Rapp & Rapp, Paramount Bldg., New York, archts. Noted Jan. 22.

Tex., Del Rio—Hughes Franklin Theatres, c/o P. J. Poag, Del Rio, bids about Apr. 15, 1 story, 30 to 40 ft. high, fireproof theatre, 1,000 seating capacity, Main and Losoila Sts. $150,000. Private plans.

CONTRACTS AWARDED

Okla., McAlester—Wallace Wilkinson, general contract 3 story (50 ft. high), basement 50 x 120 ft., 800 seating capacity, rein.-con., brick, stone, incl. lounging rooms, office, to Cowen Constr. Co., Shawnee R. & R. Theatre Enterprises, 314 Harwood St., Dallas, Tex., lessee. Noted Jan. 22. Plumbing, to Walls Plumbing Co., McAlester, electric wiring, to City Electric Shop, McAlester.

Constr. News page 145

Theatres (Continued)

Pa., Bradford—Hooker Fulton Building Corp., C. M. Hooker, 135 Congress St. and R. A. Fulton, Holley Hotel, North Bradford, 74 x 285 ft., brick, terra cotta, steel, to E. L. Van Sickle, Bradford, $500,000 cost plus basis. Bids soon on structural steel and erection. Noted Dec. 25 under "Offices."

BANKS

PROPOSED WORK

Mich., Lansing—L. and K. Black, Capital Savings & Loan Bldg., soon lets contract 15 story, basement, 66 x 88 ft., brick, steel, rein.-con. bank, office, plain found., Michigan and Washington Aves. for City Natl. Bank. Noted Dec. 11.

N. Y., Bellaire—Brooklyn Trust Co., 177 Montague St., Brooklyn, plans by H. T. Jeffrey, 90-50 Parsons Blvd., Jamaica, bank, $150,000.

CONTRACTS AWARDED

Conn., Mystic—Mystic River Natl. Bank, E. S. Huntley, pres., 1 story, basement, brick, stone, concrete, steel, plain found., to H. Wales-Lines Co., 134 State St., Meriden. Est. $150,000. Noted Mar. 5.

Mass., Somerville (br. Boston)—Winter Hill Co-operative Bank, G. Lovejoy, pres., Highland Trust Co., R. R. Rideout, chn. Building Com., and Desmond & Lord, archts., 1 Beacon St., Boston, 1 and 3 story, basement, brick, steel, stone, granite, concrete, plain found., to Capobianco Constr. Co., 44 School St., Boston. Est. $25,000. Noted Mar. 5.

OFFICES

PROPOSED WORK

Mo., Kansas City—S. W. Jenkins Sons Music Co., 1015 Walnut St., soon takes bids 8 story office building addition. $500,000. C. A. Smith, 800 Finance Bldg., archt.

N. Y., New York—Trinity Church and Corporation, c/o I. A. Streusand, 52 Wall St., 15 story, 77 x 99 ft. office, loft, 163 Chambers St. $700,000.

Pa., Pittsburgh—Richard Irvin & Co., Vandergrift Bldg., soon lets contract 7 or 8 story, 60 x 100 ft., brick, steel, terra cotta office, incl. wrecking present 5 story building, Wood and Water Sts., for West Pennsylvania Power Co., West Penn. Power Bldg. $750,000.

Tex., Laredo—W. Epstein, 310 Craig St., San Antonio and Laredo, soon takes bids 10 story, basement, 60 x 120 ft., brick, rein.-con. office building, and 2 story garage, plain founds. $500,000. W. H. Anderson, Travis Bldg., archt., Matthews & Kenan, Smith-Young Tower Bldg., engr., and L. D. Royer, Smith-Young Tower Bldg., mechanical engr., all in San Antonio. G. M. Trout, Laredo, archt. Noted Mar. 12.

CONTRACTS AWARDED

Conn., Bridgeport—Bridgeport Hydraulic Co., 820 Main St., 2 story, 70 x 120 ft., brick, steel, stone office, to Edw. E. Bray Co., 326 River St. Est. $150,000. Noted Mar. 12.

O., Akron — Allied Engineers, archts. and engrs., 283 Buckeye St., 2 story, 84 x 156 ft., brick, steel concrete top addition, to Carmichael Const. Co., 148 East Miller St., for Ohio Edison Co., c/o A. C. Blinn, genl. mgr., Terminal Bldg. Est. $200,000. Noted Feb. 26.

Pa., West Chester—Green Tree Co., Inc., c/o W. M. Stanton, archt., Otis Bldg., Phila., 5 story, basement, rein.-con., brick, steel office building, incl. apartments, stores, High and Gay Sts., to Barclay White Co., 22 North 36th St., Phila. Est. $500,000.

STORES

PROPOSED WORK

N. J., Asbury Park—Sanford Flint, 1010 Corlies Ave., 2 story, basement, brick, steel store, office, Main St. $150,000. Project in abeyance. Noted Mar. 19.

N. J., Asbury Park—J. Ackerman, 404 Asbury Ave., plans by C. B. Cook, Asbury Park Trust Bldg., 2 story, basement, brick, steel store and office. $150,000.

N. J., Maplewood—E. J. Baker, c/o W. J. Fitzsimmons, archt., 626 Central Ave., East Orange, 2 story, basement, brick, steel store, apartment, plain found., 91 Baker St. $150,000.

N. J., Newark—S. Volick, 153 Ridgewood Ave., sketches by J. B. Acocella, 9 Clinton St., 2 story, basement, brick, steel store, office, Bergen St. $150,000.

N. Y., Bayside—Owner, c/o W. T. Grant & Co., lessee, 1441 Bway., New York, store, office, Bell Blvd. To exceed $150,000.

N. Y., Brooklyn—Estate of Gertrude Prince Coombs, 44 West 77th St., New York, plans by G. and E. Blum, 415 Lexington Ave., New York, 4 story store, office, Pearl, Fulton and Willoughby Sts. $150,000.

BIDS ASKED

Conn., Hartford—Apr. 8, (extended date), by I. Wise, Wise Smith & Co., Main St., 3 story, basement, 40 x 140 ft., brick, steel, Main St. $150,000. Ethan Allen Dennison Assn., 36 Pearl St., archts. Noted Mar. 2.

N. Y., Brooklyn—See "Contracts Awarded."

CONTRACTS AWARDED

La., New Orleans—M. H. Goldstein, archt., Amer. Bank Bldg., general contract 5 story,

Constr. News page 146

basement, 100 x 200 ft., rein.-con., limestone, granite store, wood pile found., for Sears, Roebuck & Co. and Feidelman Realty Co., 717 St. Peter St., to B-W Constr. Co., 720 Cass St., Chicago, Ill., $530,000; heating and cooling system, to National Air Cond. Co., Kansas City, Mo., $82,000; elevators, to Otis Elevator Co., 852 Carondolet St., $40,690. Grand total $652,690. Noted Feb. 26

N. J., Ridgewood—Park Cliffe Realty Co., c/o W. E. Lehman, archt., 972 Broad St., Newark, general contract 2 story, basement, brick, steel, Chestnut St., to Visbeen Bros., 54 Ackerman Ave. Est. $150,000.

N. Y., Brooklyn—Kings Home Owners' Assn., 818 Avenue U, 2 story store, apartment, Avenue U and East 26th St., separate contracts. $150,000. Seelig & Finkelstein, 153 Pierrepont St., archts.

LOFTS

BIDS ASKED

Ont., Toronto—Kaplan & Sprachman, archts., 305 Dundas St. W., taking bids 12 story, basement, 100 x 100 ft., rein.-con., brick, stone, loft, Spadina Ave., for L. Coldoff & Co. Ltd., York-Piper Bldg. $300,000.

CONTRACTS AWARDED

Ill., Chicago—Leichenko & Esser, archts., 38 South Dearborn St., masonry and concrete contract 2 story, basement, 135 x 145 ft., rein.-con., incl. store, to C. E. Ericksen, 4753 Bway., for S. H. Golberg, 20th and Prairie Ave. Est. $200,000. Noted Mar. 26.

PUBLIC

PROPOSED WORK

Calif., Martinez—HALL OF RECORDS—Bd. Comrs. Contra Costa Co. plans by J. J. Donovan, 1916 Bway., Oakland, Hall of Records building, rein.-con. $500,000. Noted Feb. 5.

Idaho, Blackfoot—ASYLUM—State, Boise, authorized $250,000 bond issue for improvements, additions to Blackfoot Insane Asylum. Noted Mar. 5.

Ia., Waterloo—CITY HALL—City Council, c/o C. C. Mackey, clk., sketches city hall. $275,000.

Mass., Falmouth—ADMINISTRATION—Town, A. Underwood, chn. Bd. Selectmen, brick administration building. $150,000. Architect not selected.

Minn., Faribault—COURT HOUSE—Rice Co., c/o A. Luecke, aud., rebuilding 3 story, basement court house probably rein.-con. brick, recently destroyed by fire. $250,000.

Mass., Medford—CITY HALL—City, P. Buildings Dpt., new city hall. $200,000 or more. Architect not selected.

Mass., Worcester — COURT HOUSE — Worcester Co. Comn., H. A. Cooke, comr., addition. $1,000,000 or more. Architect not selected. Noted Feb. 5.

N. J., North Bergen—FIRE HOUSE, etc.—Bd. Town Council, Town Hall, will not build fire house, garage and signal station, rear of Town Hall. $150,000. Project abandoned. Noted Feb. 12.

N. Y., Brooklyn—MUSEUM—Brooklyn Institute of Arts & Sciences, E. C. Blum, pres., revised plans by McKim, Meade & White, 101 Park Ave., altering 5 story museum, Washington Ave. and Eastern Parkway. $265,000. Noted Jan. 22.

N. D., Bismarck—CAPITOL—State Bd. Control, rebuilding state house, destroyed by fire. $2,000,000. Noted Mar. 12.

Pa., Holmesburg (Philadelphia)—CELL—Dpt. Pub. Welfare, J. F. Dugan, dir., City Hall Annex, Phila., plans by P. H. Johnson, Architects Bldg., Phila., 2 story cell building. $500,000.

S. D., Pierre—CAPITOL—State Capitol Comn., Pierre, state capitol building annex. $270,000.

Vt., Ludlow—ARMORY—Town, Bd. Selectmen, J. McDonald, Town Hall, 1 story, basement armory. $150,000. Architect not selected.

BIDS ASKED

Calif., Tehachapi—ADMINISTRATION—Apr. 14, by State Dpt. P. Wks., Sacramento, 2 story, 20,500 sq.ft. floor space, concrete administration building for women, two 2 story cottages, each 10,500 sq.ft. floor space, concrete, tile, for State Institution for Women.

N. J., Irvington (br. Newark) — POLICE HEADQUARTERS—Bd. City Comrs., Town Hall, bids about Apr. 15, general contract 2 story, basement, brick, steel addition, Washington Ave. $150,000. G. F. Lederer, 2 Union Ave., archt. Noted Jan. 8.

N. Y., Dannemora—CELL BLOCK, etc.—Apr. 30, by Dpt. Correction, State Office Bldg. Albany, East Cell Block, laundry and bath building, segregation building, Clinton Prison; adv. E .N.-R. Apr. 2. Noted Feb. 12.

Pa., Wilkes Barre—SERVICE—Apr. 9, by Central Poor Dist. of Luzerne Co., G. K. Brown, secy., 54 West Union St., 3 story, basement service building, at Retreat. To exceed $150,000. A. L. Reiley, 58-59 Bennett Bldg., archts.

CONTRACTS AWARDED

Conn., Stamford—ALMS HOUSE—City Municipal Bldg., 3 story, basement, 90 x 188 ft., brick, steel, concrete, to Genovese & Rich, Atlantic St. Est. $150,000. Noted Dec. 4.

Mass., Newton—POLICE STATION—City, Police Dpt., 2 story, basement, brick, steel, plain found., to John MacDonald Constr. Co., 250 Stuart St., Boston. Est. $150,000. Noted Mar. 26.

Mass., Watertown—ADMINISTRATION, etc.—Town, J. P. Barrett, chn., building comm., 3 story, basement, 100 x 100 ft., brick, limestone, administration building and police station, concrete found., to W. Donaldson, 23 Centre St. $188,000. Noted Mar. 12.

Mich., Detroit—LIBRARY—Library Comn., Library Bldg., Woodward Ave., 3 story, basement, brick, steel, rein.-con., for downtown unit, plain found., to Bryant & Detwiler Co., 2800 Union Trust Bldg. Est. $300,000. Noted Nov. 20.

N. Y., New York—ARMORY—Armory Bd., J. Paul, secy., City Hall, general contract administration for 369th Infantry, to C. and W. Constr. Co., 400 East Fordham Rd., $724,000. (Note correct address for contractor). Noted Mar. 26.

Tex., Sugarland—PRISON—Purchasing Div., State Bd. Control, Austin, furnishing, installing high and low pressure piping at prison buildings to A. H. Shafer, 829 North St. Mary's St., San Antonio, $9,961; fire protection equipment and sprinkler system, to Crane Co., 1200 East Houston St., San Antonio, $4,750 and $1,350 respectively—electric contract, to Martin Wright Electric Co., 1001 Navarro St., San Antonio, $17,058; refrigeration equipment to York Ice Machine Co., 307 North Medina St., $11,900; insulation, to A. Mundet & Son, 1116 Acuff St., Houston, $7,523; work on buildings to be done by day labor. Noted Jan. 15.

UNCLASSIFIED

PROPOSED WORK

Mass., Worcester—MUSEUM—Worcester Art Museum, F. H. Dewey, Sr., pres. Bd. Trustees, sketches by W. T. Aldrich, 30 Newbury St., Boston, museum addition, Salisbury St. $150,000 or more. Noted May 22.

N. J., East Orange—MEDICAL CENTER—Medical Building Corp., A. W. Bingham, pres., 219 Harrison St., 3 story, basement, brick, steel, 144 Harrison St. $150,000. **Maturity probably soon.**

N. J., Hopatcong—EXCHANGE—New Jersey Bell Telephone Co., 540 Broad St., Newark, plans by H. B. Brady, Inc., 333 North Broad St., Elizabeth, and takes general contract bids probably in May, 1 story, basement, brick, steel, $150,000. Noted Mar. 19.

N. J., Netcong—EXCHANGE—New Jersey Bell Telephone Co., 540 Market St., Newark, plans by H. B. Brady, Inc., 333 North Broad St., Elizabeth, and takes general contract bids probably in May, 1 story, basement, brick, steel, $150,000. Noted Mar. 19.

N. J., Newark—ORPHAN ASYLUM, etc.—Hebrew Benevolent & Orphan Asylum Society, 534 Clinton Ave., Newark, orphan asylum and old peoples' home colony, both 2 story, basement, brick, steel. $150,000.

Ont., Hamilton—STATION—Toronto, Hamilton & Buffalo Ry. Co., R. L. Latham, ch. engr., sketches by Fellheimer & Wagner, 155 East 42nd St., New York, station. $1,500,000.

BIDS ASKED

Conn., Mystic—ART—Mystic Art Assn., Inc., G. A. Thompson, bids about Apr. 15 (selected list bidders), 2 story, 45 x 65 ft. and 25 x 55 ft., brick, stone. $150,000. Jackson, Robertson & Adams, 1216 Turks Head Bldg., Providence, R. I., archts. Noted Oct. 23.

Ill., Chicago—WORLD'S FAIR — Chicago World's Fair 1933, R. C. Dawes, pres., 160 North La Salle St., taking bids (4th unit), 2 story, mezzanine, 400 x 700 ft. exhibition building, 16th St. and Leif Ericksen Dr. P. Pret., 112 South 16th St., Phila., Pa., archt. Noted Aug. 7.

N. Y., New York—FIRE EXTINGUISHING EQUIPMENT—Apr. 10, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., fire extinguishing equipment for portion Independent System City-Owned Rapid Transit Railroads extending from Fulton St. to 207th St. and in 207th Street Yard and shops.

CONTRACTS AWARDED

Calif., San Francisco—WAR MEMORIAL, OPERA HOUSE, etc.—Bd. Trustees, San Francisco War Memorial, fabrication and erection 6,000 tons steel for War Memorial Building and Opera House, in Civic Center, to Columbia Steel Co., Bliss Bldg., at $79 and $91 per ton respectively. Noted Mar. 25.

Ill., Chicago—STATION—Illinois Central R.R. Co., 135 East 11th Pl., E. F. Blaess, ch. engr., general contract 2 story, 128 x 240 ft. suburban station, to J. E. Nelson & Sons, Inc., 3240 South Michigan Ave. Est. $500,000. Noted Jan. 22.

Pa., Phila.—STATION—Pennsylvania R.R. Co., Broad St. Sta. T. J. Skillman, ch. engr., clearing site and excav. for founds. for new station, incl. 250,000 cu.ft. earth excav., 60,000 lin.ft. steel pipe, 15,000 cu.yd. caissons, 60 ft. below surface on bedrock, 30th and Market Sts., to Keystone State Corp., Philadelphia Bank Bldg. Est. $150,000.

Ont., Ottawa — MAUSOLEUM — Beechwood Cemetery Co., Elgin St., brick, stone, rein.-con., plain found., Beechwood Cemetery, to Grant Bros., Bank St., $200,000. Noted July 17.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Concord—POULTRY PLANT—Wickham-Havens, Inc., 1510 Franklin St., Oakland, plans by Engineering Department of Owner.

Factories and Mills (Continued)

H. Sylvester in charge (1st unit) timber, corrugated iron poultry plant, incl. warehouses and administration building. $75,000. Total $350,000.

Calif., Healdsburg—GRAVEL PLANT—Basalt Rock Co., Napa, power plant, incl. aerial tramway, on Russian River, near here. $100,000, incl. equipment.

Calif., Stockton—REFINERY—Holly Sugar Co., West Channel St., will not build refinery near here. Project abandoned. Noted Aug. 22.

Colo., Pueblo—SAW MILL—See "Hospitals."

Ga., Atlanta—BAKING PLANT—National Biscuit Co., 449 West 14th St., New York, bids after June 1, general contract 3 story, 80 x 250 ft. addition. Magnum and Elliott Sts. $500,000. Private plans.

Idaho—PLANT—Union Pacific R.R. Co., C. H. Mack, ch. engr., 1416 Dodge St., Omaha, Neb. 18,000 gal. per hr. water treating plants, one at Burley and one at Bancroft, $54,000; improving timber treating plant, Pocatello, $30,000.

Ind., Marion—PLANT—Indiana General Serv. Co., O. Drischel, genl. mgr., plans improvements, $90,000. Private plans.

Ia., Waterloo—OIL PLANT—Continental Oil Co., Ponca City, Okla., J. L. Riordan, Ponca City, sketches bulk oil plant. $40,000.

Mass., Worcester—PASTEURIZING PLANT—Gaffney Bros., 625 Plantation St., plans by H. L. Meacham Associates, 120 Front St., 1 story, 40 x 40-ft. concrete pasteurizing plant.

Mo., St. Louis—NEWSPAPER PLANT—Midwest Industrial Development Co., c/o Illinois Terminal R.R. Co., A. P. Titus, vice pres., 314 Shell Bldg., soon takes bids superstructure 5 story, basement, sub-basement, 120 x 168 ft., rein.-con. brick, stone newspaper publishing plant, High, Morgan and 12th Sts. $1,500,000. F. D. Chase, Inc., 720 North Michigan Blvd., Chicago, Ill., archt. Star Chronicle Publishing Co., Elzey Roberts, publisher, St. Louis Star Bldg., 12th and Oliver Sts., lessee. Excavating and footings awarded to G. L. Tarlton Co., 411 North 7th St.

N. J., North Bergen—CONCRETE BLOCK PLANT—E. J. Decker, 300 29th St., Woodcliff, will not build 3 story, basement, brick, steel, 5247 Hudson Blvd. $40,000. Project abandoned. Noted Mar. 19.

N. Y., Brooklyn—MANUFACTURING—International Cork Co., c/o I. Adelsohn, archt., 44 Court St., sketches 2 story, 100x200 ft., manufacturing plant, also small garage. Morgan and Norwalk Aves. To exceed $40,000.

O., Sandusky—PACKING PLANT—Waldock Packing Co., F. P. Waldock, pres., sketches by Anders & Reimers, Columbia Bldg., Cleveland, 2 story, basement, brick, steel, concrete addition. $40,000.

Pa., Bradford—BOTTLING PLANT—Coca Cola Bottling Wks., A. Gleitsman mgr., 20 Roberts St., revising plans and soon takes new bids 1 and 2 story, basement, 75 x 100 ft., brick, stucco, McKean Co. $40,000. Private plans.

Pa., Pittsburgh—FACTORY—D. J. Rex Box Co., c/o D. J. and J. S. Rex, Boyd and Locust Sts., sketches brick, steel, Boyd and Locust Sts. $40,000. Private plans.

S. C., Anderson—TEXTILE MILL—Appleton Mills soon lets contract altering and constructing addition. To exceed $150,000. Sirrine & Co., Greenville, engrs.

Tex., Beaumont—COLD STORAGE PLANT, etc.—Decker Packing Co., c/o E. S. Selby, mgr., Mason City, Ia., plans by R. C. Heartfield, Goodhue Bldg., cold storage plant and office, Crocket St. $70,000.

Tex., Brownsville — CANNING PLANT — Walker-Craig Co., Brownsville, plans constructing and equipping 6 canning plants in Rio Grande Valley.

Tex., Bryan—MACHINERY PLANT—Stevenson Mchy. Co., rebuilding 1 story, brick, rein.-con. machinery plant, incl. assembling equipment machinery. Private plans.

Tex., Mission—CANNING and PACKING PLANT—J. P. Snavely Primera, Mission, 2 story, brick, rein.-con., found. $150,000. Architect not selected.

Tex., San Antonio — MANUFACTURING PLANT—Hydro-Plant Corp., D. J. Little, pres., c/o L. E. Rush, Western Life Insurance Bldg., purchased site west of city limits and plans plant, incl. general offices, engineering department, automotive department, machine and tool department, pump manufacturing department, general factory and power transmission department. $500,000.

Tex., Tyler—SKIMMING PLANT—G. Constantine, 1330 Terrace Dr., Tulsa, Okla., skimming plant, 6,000 bbl. daily capacity. $400,000. Private plans.

Vt., Bellows Falls—MANUFACTURING, etc.—Vermont Newspaper Corp., W. E. Belknap, Bellows Falls, soon takes bids 1 story, basement, brick, steel manufacturing and office building, plain found. $40,000 or more. H. H. Owen, 3 North State St., Concord, N. H., archt. Noted Feb. 19.

W. Va., Hollidays Cove—SLAG GRINDING PLANT—Standard Slag Co., City Bank Bldg., Youngstown, O., plant. $40,000. Pennsylvania R.R. Co., will build spur to new plant.

Alta., Edmonton — PACKING PLANT — Alberta Co.—Operative Livestock Products Ltd. packing plant. $75,000.

N. S., Halifax—PLANT—Neon Tube Gas & Electric Sign Co. Ltd., illuminated sign manufacturing plant. $50,000-$75,000.

Ont., London—GAS PLANT—City Gas Co., W. C. Duffield, mgr., expending $1,000,000, additional plant, equipment, incl. large steel gas holder, retorts and general equipment. Private plans.

BIDS ASKED

Calif., Anaheim — PRE-COOLING PLANT — H. A. Hamm, archt., 2145 Sacramento St., Los Angeles, taking bids 1 story, 55 x 105 ft., rein.-con., hollow tile pre-cooling plant, for Golden State Citrus Products Co. $70,000.

Mass., Cambridge—CLEANSING PLANT—H. J. Shea & Co., 2225 Mass. Ave., taking bids on revised plans 1 story, basement, 60 x 100 ft., brick, steel, concrete found., Mass. Ave. $40,000. W. Galvin, 34 Brattle St., archt. Noted Feb. 19.

N. J., Newark—WOODWORKING FACTORY—W. Snyder, archt., 790 Broad St., taking bids general contract 3 story, basement, 50x100 ft., brick, steel, New York Ave., for J. C. Kohaut, Inc., 117 Green St. $40,000. Noted Jan. 8 Daily.

N. J., Ridgefield Park—PAPER PLANTS—Johnson & Wierk, archts., Grand Central Terminal, New York, taking bids two 2 story, basement, brick, steel, for Continental Paper Co., River Rd., Bogota. $40,000.

N. J., Wallington—BAKERY—Apr. 6, by J. Boruta, 103 Halstead St., and J. Camlet, archt., 26 Piaget Ave., Clifton, general contract 2 story, basement, brick, steel bakery plant, store, and garage, Mercer St. and Wallington Ave. $40,000. Noted Mar. 5.

N. Y., Jamaica—FACTORY—See "Contracts Awarded."

N. Y., Sonyea—BAKERY—Apr. 15, by Dpt. Mental Hygiene, State Office Bldg., Albany, bakery building at Craig Colony for Epileptics. $40,000. Noted Mar. 5.

CONTRACTS AWARDED

Calif., Berkeley—CREAMERY—G. R. Heath, 2930 Garber St., rein.-con., San Pablo Ave., to E. H. Wendt, 2116 Allston Way. $75,000. Noted Mar. 19.

Conn., Thompsonville—BAKERY—J. Mylek, 56 School St., 1 and 2 story, 50 x 110 ft., brick, timber, Church St., to Alessi Bros., 35 Memorial St., West Springfield, Mass. Est. $40,000.

Ill., Peoria—FACTORY—Murison Label Co., Inc., Com. Natl. Bank Bldg., R. I. Bentley, vice pres., 1 story, 69 x 102 x 231 ft., brick, steel, 5 mi. north of here, to W. M. Allen Son Co., Jefferson Bldg., est. $150,000.

Ind., Indianapolis—BAKING PLANT—Frethofer Baking Co., 359 East Merrill St., general contract 3 story, brick, steel, to Brandt Bros., 611 Architects Bldg. Est. $40,000.

Ia., Davenport—FACTORY—Davenport Candy Co., 211 East 2nd St., 1 story, basement, 60x200 ft., concrete, brick, to John Soller Constr. Co., Old Masonic Temple Bldg. Est. $40,000. Noted Feb. 26.

Me., Portland—FACTORY—Cushman Baking Co., N. A. Cushman, 105 Elm St., altering and constructing 2 story, brick addition, to Brown Constr. Co., 574A Congress St. Est. $40,000. Noted Mar. 26.

Mass., New Bedford—FACTORY—Continental Wood Screw Co., 459 Mt. Pleasant St., 2 story, brick, 50 x 100 ft., brick addition. $45,000. Owner builds. Private plans.

Mass., South Lee—PLANT—Dwight D Hopkins Lumber Co., D. D. Hopkins, pres., 1 story, 60 x 160 ft., brick, concrete plant. $75,000 incl. equipment. Owner builds. Private plans. Noted Jan. 8.

Mo., St. Louis—NEWSPAPER PLANT—See "Proposed Work."

N. Y., Jamaica—FACTORY—Aluminate Co., Hillside Ave., manufacturing plant, 132nd Ave. and 91st St., day labor and separate contracts. $40,000. H. T. Jeffery, 90-50 Parsons Blvd., archt. Owner now taking bids on separate contracts. Noted Mar. 19.

O., Canton—PACKING PLANT—Sugerdale Provision Co., H. L. Lavin, pres., 1 story, brick, concrete, to Boldt-Rapp Constr. Co., 6007 Euclid Ave., Cleveland. Est. $40,000.

O., East Liverpool—POTTERY PLANT, etc.—C. C. Thompson Pottery Co., East Liverpool, 2 story, basement, 50 x 150 ft., brick, pottery plant, to house new tunnel kiln, River Rd., to Potters Lumber Co., East Liverpool $50,000; 135 ft. Robertson type tunnel kiln, River Rd., to H. L. Dixon Co., Rosslyn Rd., Pittsburgh, Pa., $40,000.

Every new factory means new equipment and materials for both construction and operation—CONSTRUCTION DAILY, 10th Ave. at 36th St., New York.

GARAGES

PROPOSED WORK

Mass., Dorchester (sta. Boston)—J. A. Singarella, Park Sq. Bldg., Boston, sketches 1 story, 50 x 105 ft., concrete garage, office, Mt. Vernon St., $45,000. Private plans.

N. Y., Brooklyn—Atlantic and Classon Avenue Corp., 26 Court St., A. Koplan, pres., plans by W. A. Lacerenza, 26 Court St., 1 story, 100 x100 ft. service garage and gas station, Atlantic and Classon Aves. $40,000.

N. Y., Brooklyn—Long Island R.R. Co., A. C. Watson, ch. engr., Pennsylvania Sta., New York, 1 story, 110 x 240 ft. service garage, ocean Ave. and Avenue H. $60,000. F. H. Klic, 250 Park Ave., New York, archt. **Maturity July 1 or later.** Noted Mar. 19.

Tenn., Memphis—Bluff City Delivery Co., 308 Court St., R. G. Watkins, pres., plans by Hanker & Cairns, Court Square Bldg., 2 story garage, headquarters for 80 trucks in addition to 61 now in use, 305-25 Jefferson Ave. Heating contract awarded to Hughes Heating Co., 8672, Madison St.; electrical work to Dawkins Electric Co., 26 North 2nd St.; plumbing to Pritchard Bros. Plumbing Co., 433 Madison St. Total $50,000.

BIDS ASKED

N. Y., Flushing—See "Contracts Awarded."

N. Y., Tottenville (br. Staten Island)—Apr. 7, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, repair company building, Johns Ave. Noted Feb. 26.

CONTRACTS AWARDED

Mass., Belmont—Town, Electric Light Dpt., 1 story, 50 x 110 ft., concrete garage, storeroom, to Betts Bros., 31 Bartlet Ave. Est. $45,000. Noted Feb. 19.

N. Y., Flushing—Faw Realty Co., 1840 Myrtle Ave., Ridgewood, service garage, Lawrence St. and Avery Ave., separate contracts $40,000. **Maturity in August.** H. Bruckner, 1047 Kossuth Pl., Glendale, archt. Noted Mar. 19.

Tenn., Memphis—See "Proposed Work."

POWER PLANTS

PROPOSED WORK

Calif., Brawley—City Council making reports power plant improvements, Burns & McDonnell Eng. Co., 406 Interstate Bldg., Kansas City, Mo., engrs.

Colo., Pueblo—See "Hospitals."

Ind., Shelbyville—C. C. Shipp, power plant on Flat Rock River, incl. 425 sq.mi. drainage area, 238 ft. concrete dam 20 ft. 4 in. high, 550 ft. retaining wall, 147 ft. spillway, 9 mi. from here. $175,000. Schaeffer & Gill, Indianapolis, engr.

Mass., Reading — Town, Electric Light & Power Dpt., 177 Main St., 1 story, brick power plant addition, incl. switchboard room, Ash St. $45,000.

Me., Biddeford—Cumberland Co. Power & Light Co., 443 Congress St., Portland, G. E. Haggas, ch. engr., power plant, power development, incl. transmission lines on Saco River. $300,000. Private plans.

N. Y., Dongan Hills (mail Staten Island)—Dpt. Hospitals, Municipal Bldg., New York, bids about August, power house and heating system, at Sea View Hospital. $40,000. Sibley & Fetherstone, 205 East 42nd St., New York, archts. Noted Jan. 1.

N. Y., Dongan Hills (mail Staten Island)—Dpt. Hospitals, Municipal Bldg., New York, bids about August, general contract garage, repair shop, at Sea View Hospital. $80,000. Sibley & Fetherston, 205 East 42nd St., New York, archts. Noted Jan. 1.

N. D., Grafton—State Bd. Administration, E. F. Warner, secy., Bismarck, 2 story, basement, brick, steel, rein.-con. heating plant, State School for Feeble Minded. $150,000.

Utah, Salt Lake City—Union Pacific R.R. Co., R. C. Mann, ch. engr., 1416 Dodge St., Omaha, Neb., brick, steel, power plant, steam generating equipment. $238,000.

BIDS ASKED

Colo., Yuma—Apr. 20, by Town, W. H. Jackson, mayor, power plant, incl. one or two 200 and 400 kw. steam driven or Diesel engine driven generators with accessories and auxiliaries; one or two 200 to 250 kw. Diesel engine generator set for 3 phase, 60 cycle, 2,300 volts, with direct connected exciter and voltage regulators; one or two 200 kw., one or two 300 kw., one or two 400 kw. steam driven generators; one or two surface condensers for steam driven generator; one or two stokers for 1,340 sq.ft. Casey Hedges vertical baffled boilers, one or two superheaters for 1,340 sq.ft. Casey Hedges vertical baffled boilers. L. P. Miller, town clk.

Conn., Bristol—Connecticut Light & Power Co., Riverside Ave., taking bids 3 story, 60 x 60 ft., brick, steel, concrete plant, incl. oil burners, steel storage tanks, central heating plant, concrete found., Riverside Ave. To exceed $40,000. H. A. Hayden, 175 Main St., archt. Noted Feb. 19.

CONTRACTS AWARDED

Kan., Kansas City—Bd. Pub. Utilities, furnishing, installing equipment for electric wiring in power plant, to Kelso-Wagner Electric Co., 134 West 2nd St., Dayton, O., $45,950. Noted Feb. 5.

WAREHOUSES

PROPOSED WORK

Mass., Jamaica Plain—Boston Consolidated Gas Co., 250 Stuart St., Boston, sketches 5 story, brick, concrete warehouse, garage, service yard, McBride, Washington and Water Sts. To exceed $50,000. Private plans.

BIDS ASKED

Ind., Wabash—Apr. 10, by Indiana Serv. Corp., brick, steel freight traction station, $40,000. Private plans.

See proposal advertising on page 106

Constr. News page 147

The **Equipment Number** of Engineering News-Record will be **April 9th**

Engineering News-Record will publish its Annual Equipment Number, April 9th. It will be devoted to the economy, speed, technique and art of construction by machinery, and to the machines that have helped construction men make construction progress. This issue will help construction men in every activity in the field find the machines and methods that will give them the greatest efficiency on the job and the best returns on their investments.

Published April 9th, at a time when engineers and contractors are busy sizing up equipment for new contracts—specifying and selecting their machinery and materials—it will be especially timely.

The latest contributions of the manufacturers will be found in the advertising pages. This specific information, complementing that in the editorial section, will be a valuable help to engineers and contractors in selecting their equipment for the jobs ahead. The newest types, makes and improvements of construction machines and materials will be shown and described.